THE
AMERICAN
JOURNAL OF PHARMACY,

PUBLISHED BY AUTHORITY OF THE

PHILADELPHIA COLLEGE OF PHARMACY.

EDITED BY

JOSEPH CARSON, M. D.
Professor of Materia Medica in the Philadelphia College of Pharmacy,

ASSISTED BY A PUBLISHING COMMITTEE,

CONSISTING OF CHARLES ELLIS, WM. PROCTER, JR., A. DUHAMEL,
AMBROSE SMITH, THOMAS P. JAMES, AND

ROBERT BRIDGES, M. D.
Professor of Chemistry in the Philadelphia College of Pharmacy.

NEW SERIES, VOL. XI.

Philadelphia:
Merrihew & Thompson, Printers,
No. 7 Carter's Alley.

1846.

PUBLISHING COMMITTEE.

CONTENTS.

No. I.

No. II.

No. III.

No. IV.

[illegible]

THE

AMERICAN JOURNAL OF PHARMACY.

APRIL, 1845.

ART. I.—ON MARRUBIUM VULGARE.

BY JOSEPH ALLEN M'MAKEN.

(Extract from an Inaugural Thesis.)

THE author after a general view of the botanical and medical characteristics of the plant, arrives at the following results, by a series of experiments, viz: That marrubium vulgare contains gum, tannic acid, vegetable albumen, resin, volatile oil, fatty matter, wax, potassa, chlorophyllin, lignin, and a peculiar crystalline bitter principle, soluble in alcohol and ether and insoluble in water. The process for isolating this principle, as given by the author, is contained in the following extract from his inaugural essay.—ED.

"Three ounces of the dried herb were macerated in a pint of water acidulated with hydrochloric acid for twenty-four hours, and then boiled for fifteen minutes and strained. The residue was boiled in three successive portions of water acidulated as before, and all the liquid pressed out and strained. These clear solutions were mixed and heated to the boiling point, when slaked lime was gradually added until it ceased to precipitate. The precipitate thus obtained was separated, washed well with water, pressed and dried; and then, after being pulverized, was digested in successive portions of boiling alcohol until all the bitterness was removed. These solutions were mixed and evaporated until a black oily substance remained, which was well washed with boiling water, re-dissolved in alcohol, and the alcoholic solution boiled with animal charcoal, filtered and evaporated to a small bulk and set aside. When cold, crystals were deposited, which were contaminated with fatty matter. The impure crystals were dissolved in a large portion of cold alcohol, and the fatty matter separated by filtration. The solution, after being boiled with animal charcoal, filtered, and concentrated, yielded fine silky needle-shaped crystals of a white color, which weighed four and a half grains when dried. This substance, from subsequent experiments, appears to be the bitter principle. It is insoluble in water, soluble in ether, and more so in hot than in cold alcohol; it is perfectly neutral, having no effect on either turmeric or litmus; is destitute of odor, but having in solution a very intensely permanent bitter taste, and melts like resin when heated.

Neither the sulphuric or hydrochloric acids produce any change, but nitric acid causes it to assume a deep yellow color. It does not unite with either acids or alkalis, nor is it precipitated by subacetate of lead, corrosive sublimate, the persalts of iron, or iodine."

ART. II.—NOTE ON VALERIANATE OF ZINC.

BY WILLIAM PROCTER, JR.

HAVING had occasion to prepare this salt several months ago, the inconvenience of distilling so bulky an article as valerian (which swells much by maceration) was found to be so great, that in order to supersede the necessity of placing the root in the still the following method was resorted to, viz. Four pounds of valerian in coarse powder were thrown into two gallons of hot water, in which had been dissolved four drams of caustic potassa; the whole was heated for a short time, and then allowed to macerate for twenty-four hours, and then displaced with water until the liquid passing possessed but little taste. The clear infusion, which was slightly acid to litmus paper, was saturated, and evaporated until reduced to two pints, and as much diluted sulphuric acid was added as would neutralize the quantity of alkali employed. By this means the valerianate of potassa formed in the infusion was decomposed, and its acid set free. The whole was then placed in a glass retort on a sand bath, the distillation conducted until the liquid passing over was but slightly acid to litmus. The liquid in the receiver consists of a saturated solution of valerianic acid, with globules of that acid floating on its surface.

The next step in the process consists in preparing the hydrated carbonate of zinc by precipitation from a solution of the pure sulphate, by carbonate of soda, and washing to remove the saline matter.

The valerianic solution is then placed in a suitable vessel, an excess of the hydrated carbonate added, and the mixture heated until effervescence ceases and the saturation is effected,—the liquid should then be filtered, evaporated and crystallized. If the process has been carefully conducted, the product will amount to two drams, or about thirty grains per pound.

The salt thus obtained is often colored brownish, and if required, can be obtained white by re-dissolving, treating with charcoal and again crystallizing. Since adopting this method, which yields a larger product than by saturating the distilled water with the hydrated carbonate, I have seen a similar suggestion in the *L'Abeille Medicale*, by M. Guilleminet Macors, Pharmacien of Lyons, who, however, employed the carbonate of potassa.

M. Rabourdin, Pharmacien at Orleans, employs the following process, viz: About eleven pounds of valerian to be distilled with a sufficient quantity of water, containing three troy ounces of concentrated sulphuric acid. When thirty pints of product has been obtained by distillation, the volatile oil is separated and the liquid saturated with from 22 to 25 drams of carbonate of soda, then evaporated to one pint, a slight excess of sulphuric acid added, and then distilled. By this process M. Rabourdin obtained from 11 to 12 drams of valerianic acid—a much larger quantity than is usually obtained.

By whatever process made, there should always be sufficient water to hold all the valerianate in solution when the liquid is hot, else a portion may be lost in separating the excess of carbonate of zinc. The salt requires about fifty times its weight of water for solution.

ART. III.—REPORT OF THE NEW YORK COLLEGE OF PHARMACY.

At a Stated Meeting of the Board of Trustees of the College of Pharmacy of the city of New York, held April 3d, 1845, an extract from the minutes of the last meeting of the College was read, in which a report from the Committee of Inspection was referred to the present Board, with instructions to proceed with it as they may think advisable.

Whereupon, it was on motion

Resolved, That a copy of the report of the Committee of Inspection be forwarded to the publishers of the American Journal of Pharmacy for publication, with the addition that the article has been sold by the importors to wholesale druggists, and is now supposed to be in the market.

As far as the Board of Trustees are informed, it is in stone ware tie-over pots, containing one and a half pounds each.

COPY OF REPORT.

The Committee of Inspection beg leave to report that a specimen of blue mass was handed to them by Mr. Aspinwall, imported by Cumming, Main & Co., as is said, from Mr. William Bailey, of Wolverhampton, England, and supposed to contain 25 per cent. of mercury. Mr. Aspinwall sent a sample to Professor Reid for examination, who reports it to contain 10 per cent. of mercury, besides a considerable quantity of weighty earthy matter, probably added with a view of increasing its specific gravity. On application to the Professor, he handed to the Chairman a sketch of his method of analysis, herewith enclosed, and he also offered to repeat it before the Board.

All of which is respectfully submitted.

C. Adamson, Chairman.

By order,

John Meakim, Secretary.

New York, March 19th, 1845.

ART. IV.—ON THE CONVERSION OF BENZOIC INTO HIPPURIC ACID.

BY JAMES C. BOOTH AND MARTIN H. BOYÈ, M.D.

(*From the Transactions of the American Philosophical Society.*)

The importance of the application of chemical principles to the various processes in the animal economy, not less than their interesting character in a scientific point of view, having led us to undertake a few experiments on a singular fact observed some years since by Woehler, we have deemed them worthy of being offered to your notice on the present occasion, although time has failed in completing the series of investigations which was contemplated. I therefore propose to offer you a few remarks on the "Conversion of Benzoic into Hippuric Acid," which are the results of the conjoint labors of Professor Booth and myself.

Before entering into the details of the present treatise, it may not be out of the way to make a few remarks on some of the most important ingredients of urine, as far as connected with the present subject; urine contains about ninety-three parts of water and seven of solid substances. Of these seven parts of solid substances, a substance called urea forms three parts. About two parts are formed by inorganic substances, such as chlorides of potassium, sodium and ammonium, sulphates of soda and potassa, and the phosphates of lime, magnesia, soda and ammonia; while the remaining two parts are mostly formed of other organic substances, as extractive matters, mucus of the bladder, some lactic acid and uric acid.

Urea is in every respect the most remarkable substance in the urine, and that which imparts to it its most peculiar characters. It is a white crystallizable substance, and very soluble in water. It seems to stand on the borders between organic and inorganic substances. It may be produced artificially from inorganic substances, and is itself readily converted into carbonate of ammonia by taking up the elements of one atom of water. It combines with some acids, such as the nitric and oxalic acids, and performs in these compounds the part of a base.

Lithic or uric acid forms only a very small part of the urine; being about one-seventieth of the solid substances, and only one-ten thousandth part of the whole urine. It is very insoluble in water, and this is the reason that it for the most part deposits from urine on cooling. By oxidation it yields, among other products, urea. It forms the greater part of urinary concretions.

The urine of herbivorous animals does not contain any uric acid, but another acid, called hippuric acid, from ‘ιππος a horse, in whose urine it was first discovered. It only contains seven per cent. of nitrogen, while uric acid contains thirty-three per cent. By oxidation, it yields, among other products, benzoic acid.

The urine of the horse sometimes contains benzoic acid instead of hippuric. Benzoic acid is generally obtained from gum-benzoin by subjecting it to a gentle heat; when it sublimes in crystalline needles. It will be observed that it contains no nitrogen. It belongs to a series of compounds, which in a historical point of view are of interest, as containing the first well established radical in organic chemistry; that is to say, an imaginary body, which, though never isolated by itself, may be carried through a series of combinations with most of the simple elementary bodies.

The question now naturally arises, how is this transformation of benzoic acid into hippuric effected? We have seen that the normal quantity of uric acid is too small to suffice, if its formation depended on this acid, and, besides, their formation seems independent of each other. That the transformation should be effected in the stomach and intestines during the digestion is less probable : it seems more probable to suppose that it takes place during the subsequent circulation of the blood, and that its formation is connected with that of the urea. We know that at least the principal source of urea is the transformation of the tissues in the body, or what Prout calls the destructive assimilation, since its formation continues, when animals are fed exclusively on non-nitrogenized food, and when they are starved; and that it is not secreted by the kidneys, but actually formed in the body, and merely excreted by them, is proved by removing them, when urea will be found in the blood. The same occurs by suppression of urine. I have myself lately had an opportunity to confirm this observation, in examining, at the request of Drs. Pepper and Sargent, the blood of a patient who for some time previous to her death had a complete suppression of the urine. But the question then is,—is it merely a simple chemical reaction between the benzoic acid and the products of the transformations of the tissues, or does it actually affect the chemical changes, by which the latter are effected, so as to cause new chemical products to be their results. Liebig takes this latter view in his Animal Chemistry. We quote his own words:

"Benzoic acid, when administered internally, appears in the form of hippuric acid. Should the observation be confirmed, it will acquire great physiological significance, since it would plainly prove, that the act of the transformation of the tissues in the animal body under the influence of certain matters taken in the food, assumes a new form with respect to the products, which are its results; for hippuric acid contains the elements of one at. of urea, one of lactic acid, and two of benzoic acid."

Liebig then at once proceeds to make an application of this fact to the action of medicinal agents. We are not disposed to dispute his theories on this point, nor deny that such may be the case in active remedies, but we believe that he is too prompt in drawing the conclusion, that because benzoic acid is converted into hippuric by entering into the system, it should, therefore, necessarily affect the usual chemical changes in the body. We are disposed to consider it as a mere chemical reaction between the benzoic acid and the substances of the blood, either those which are used for the formation of the tissues, or, more probably, those which result from their dissolution. But if this be correct, it follows, that we may be able to perform the same transformation out of the body. It was with a view of determining this point that our experiments were undertaken, and we still look for success, although they have not hitherto afforded a satisfactory result.

Woehler was the first to observe that benzoic acid, when administered internally to a dog, and again separated from the urine, reappeared as prismatic crystals, unlike benzoic acid; and he conjectured correctly, from their resemblance to hippuric acid, that the former by passing through the system was converted into the latter. He also suggested, that this might be the source of the hippuric acid in the urine of herbivorous animals, since the benzoic acid might be supposed to occur in their food, and by the digestion be converted into hippuric. Ure subsequently stated, that he had found hippuric acid in the urine of a patient who had taken benzoic acid; he also supposed that the uric acid had been employed in this conversion, and recommended it as a remedy for calculous concretions of uric or lithic acid. This induced Keller, at the instigation of Woehler, to make some experiments on this point, which he published in Liebig's Annals of Chemistry and Pharmacy. He took, in the evening before bed-time, two grammes or about thirty-one grains of benzoic acid, and found the next morning, on examining the urine, that by the addition of chlorohydric acid it deposited long prismatic crystals, which it continued to do as long as he continued the use of benzoic acid. By re-dissolving these crystals in hot water and treating them with animal charcoal, he obtained them perfectly colourless. The crystals thus obtained behaved in all respects like pure hippuric acid. They fused easily, and by a stronger heat they charred with a smell of oil of bitter almonds and sublimation of benzoic acid. He also determined the quantity of carbon, which he found to agree with that of hippuric acid, namely, 60.7 per cent., while benzoic acid contains 69.1 per cent. of carbon.

Keller furthermore ascertained that the urine from which hippuric acid had been separated, deposited a large amount of nitrate of urea, on the addition of nitric acid. It had also previously deposited uric acid. It therefore contained these two usual ingredients of urine. He also inferred, that since the urine could be inspissated without depositing hippuric acid before the addition of chlorohydric acid, it was evident that the hippuric acid existed in combination with a base.

As hippuric acid may be said, to a certain extent, to replace uric acid in the herbivorous mammalia, this probably led Ure to the supposition that the uric acid was employed in the conversion of the benzoic acid; but Keller's experiment showed that the urine deposited uric acid, and that therefore this latter assertion could not be correct.

We have repeated Keller's experiments, and with the same results. We have in general found that after the use of benzoic acid the urine makes a copious deposite of uric acid, both in the red or dark-colored variety and in that of a clay-colored or muddy appearance.

In one experiment the urine was examined in the morning when no benzoic acid had been taken. It deposited no sediment on cooling, and when tested for uric acid by the addition of nitric acid, the latter effected after twenty-four hours a deposite of only a few isolated colorless crystals scattered over the inside of the vessel. The same day two grammes of benzoic acid were taken immediately after dinner. Twenty minutes afterwards the urine was voided, evaporated to one-fourth its volume, and chlorohydric acid added. After the lapse of twenty-four hours it had deposited a precipitate of a granular appearance and of a very dark-red nearly black color, which dissolved with effervescence in nitric acid, and on evaporation yielded the beautiful purple color of purpuric acid. It therefore consisted of uric acid. Twenty minutes after the first, another portion was obtained, which, treated in the same way, yielded a precipitate in all respects similar to the above. Its quantity also had not diminished; but besides this precipitate there appeared a moderate quantity of needle-shaped crystals of hippuric acid.

These experiments evidently show that the formation of hippuric acid does not diminish the quantity of the uric acid, and that the formation of the former seems entirely independent and disconnected with that of the latter. The urine voided in the morning had a sp. gr. of 1.0112. That voided three or four hours after dinner, and therefore containing most of the hippuric acid, had a sp. gr. of 1.024. Its color was but slightly more yellow than the former.

Distinction is generally made between the urine secreted after fluids have been taken, especially on an empty stomach, and that secreted subsequently to the digestion of food. The former is much more limpid and tasteless, and contains much less of the solid ingredients. It has been found, that if any substance be taken under the first circumstances, dissolved in the water, it passes much more rapidly into the urine, where some substances have been detected in the short time of from two to ten minutes after their introduction into the stomach; while, when taken with the food, they generally require a much longer time for their reappearance in the urine. In regard to the time which elapses before the benzoic acid reappears as hippuric, it will be seen that in the above experiments it had not yet appeared there in twenty minutes, and that forty minutes after being taken its appearance had but fairly commenced. In another experiment, where the benzoic acid, was taken immediately before dinner, a portion of urine, obtained immediately after the meal, and about thirty minutes after the introduction of the acid yielded, when treated as above, an abundant crop of crystals. It was interesting to ascertain how long the hippuric acid would continue to appear in the urine from the time the benzoic acid was taken. In an experiment, where two grammes were taken before and two grammes more immediately after dinner, the urine secreted (from seven to eleven o'clock in the evening or) from four to eight hours after its introduction contained an abundance of hippuric acid, while none could be detected in the urine voided after that time the next morning.

The quantity of hippuric acid obtained exceeds that of the benzoic acid taken; six grammes taken, two grammes after breakfast, two before and two after dinner, yielded in two experiments about eight grammes of crude hippuric acid, or about one-third more than its own weight.

It was a matter of considerable interest to ascertain with what base the hippuric acid occurred combined in the urine, whereby it was held in solution till liberated by an acid. The bases occurring in the urine are potassa, soda, lime, magnesia, and ammonia. Besides these, urea seems in some instances to have a basic nature : thus, in the compounds which it forms with nitric and oxalic acids it evidently acts the part of a base. Cap and Henry have asserted that a portion of it occurs combined with lactic acid in human urine and with hippuric acid in urine of the horse, and they prescribed a method of forming these two compounds by double decomposition of lactate or hippurate of lime and oxalate of urea, and they also described the methods by which they had extracted the lactate of urea from human urine, and the hippurate of urea from the urine of the horse. The former was repeated by Lecanu, who could obtain no lactate of urea. Cap and Henry replied, and gave a new method of obtaining it in crystals by shaking the inspissated urine with a mixture of one volume of alcohol and two volumes of ether, and evaporating the solution by heat over sulphuric acid in a closed vessel. Very recently Pelouze has shown, that neither lactate nor hippurate of urea can be obtained by double decomposition, or in any other way, and that they therefore do not exist, and that Cap and Henry had nothing but urea, which had imbibed the acids.

If hippurate of urea therefore existed, it would not be improbable that this acid might occur combined with urea in the urine, and in our experiments particular attention was paid to this point. The urine was evaporated, filtered, and further evaporated in a water-bath to a thick syrup, and then left at rest for several weeks, in the hope that the combination of hippuric acid would crystallize. A quantity of crystals appeared, which, being well drained from the mother-liquid, were found to contain no hippuric acid. They consisted chiefly of chlorides of ammonium and sodium, with the phosphates of the same bases. The mother-liquid, on the contrary, formed nearly a solid mass when tested for hippuric acid by the addition of chlorohydric acid. By adding more water, and straining the mother-liquid from the crystals, subsequent addition of nitric acid caused an abundant precipitate of nitrate of urea. The main mass of the syrup was now shaken for several days in a closed bottle with a mixture of one volume of alcohol and two volumes of ether, which were decanted and evaporated by heat over sulphuric acid. While concentrating, it yielded prismatic crystals, and finally the whole was converted into a mass of crystals with but little mother-syrup. The crystals were carefully dried between blotting paper. They were, therefore, obtained according to Cap and Henry's directions for extracting the lactate of urea; but they proved to be pure urea, so that unless the lactic acid has been employed in the formation of hippuric acid, lactate of urea is not obtained in this way, and at all events it shows that urea is also dissolved by this process. The same proceess of extraction was repeated with a fresh portion of the same mixture, and with the same results; but the evaporation was not carried so far, in order to be able to examine the mother-liquid. We obtained a crop of crystals of pure urea, containing no hippuric acid, while the mother-liquid had a bitterish taste, but did not yield hippuric acid by the addition of chlorohydric acid. It was therefore evident that the above mixture extracted pure urea, while it left behind the combination of hippuric acid· We next employed a mixture of equal volumes of alcohol and ether, which dissolved a much larger quantity from the original syrup, but on evaporation yielded only a slight crop of crystals. The greater part of it remained as a thick syrup, yielding an abundance of crystals of hippuric acid by the addition of chlorohydric acid, but also a large amount of nitrate of urea by the subsequent addition of nitric acid. It was therefore evident that the compound of hippuric acid was also extracted by the last treatment, and it merely remained to find the base. A few drops of the syrups charred and incinerated, left no residue, proving the absence of all the fixed bases of the urine. The hippuric acid could therefore only be combined with urea or ammonia, to ascertain which chlorohydric acid was added to a portion of it, and after the separation of the hippuric acid, chloride of platinum added, which caused a very copious precipitate of chloroplatinate of ammonium. The addition of nitrate of silver and nitric acid to the liquid proved it to contain a certain amount of chlorine as chloride of ammonium, but much less than would be able to yield a precipitate so copious as the above. We, therefore, continued the extraction by fresh portions of equal volumes of alcohol and ether, and thus succeeded in obtaining a solution that yielded by evaporation a viscid mass, which, by addition of chlorohydric acid, gave an abundance of hippuric acid, and by subsequent addition of chloride of platinum a corresponding copious precipitate of chloroplatinate of ammonium; but on the addition of nitric acid it yielded no nitrate of urea nor any trace of this substance by evaporation, but only copious crystals of chloride of ammonium. It was thus made evident that urea is not combined with the hippuric acid, but that the base which retains it in solution, and with which it is combined, is ammonia. It also confirms the assertion of Pelouze that hippurate of urea does not exist.

The results of the foregoing experiments may be summed up thus:

1. The formation of uric acid in healthy urine is not affected either in regard to its quantity nor to its external properties in general by the introduction and transformation of benzoic acid into hippuric acid in the system.
2. The time required for the benzoic acid to pass through the system, and reappear as hippuric in the urine, is from twenty to forty minutes after its introduction with food into the stomach. Its occurrence continues for four or eight hours, but then ceases.
3. The quantity of hippuric acid obtained from the urine is greater than that of the benzoic acid taken. In round numbers it may be stated to be one-third more.
4. Urea is not in combination with the hippuric acid in the urine.
5. The base with which the hippuric acid is combined, and which keeps it in solution, is ammonia.

ART. V.—ON THE ACTION OF LEAD IN DISTILLED AND RIVER WATER.

BY RICHARD PHILLIPS, JUN.

The author considers, from the action which is the subject of his paper, the following points of interest to arise: 1st, whether it is necessary that the lead should be exposed to the air, or whether the action would take place if it were below the surface of the water; 2nd, whether pure or distilled water, deprived of all atmospheric air, has any action on lead; 3rd, as to what is the nature of the white precipitate; 4th, if, besides this white precipitate, any soluble salt of lead is found; and 5th, as to which of the salts contained in river-water the non-formation of the white precipitate is due.

He proceeds to notice the remarks of Dr. Christison and Colonel Yorke on these subjects, and then gives his own experiments.

As to the first. In bottles containing distilled water were placed two pieces of lead of nearly equal size. In both a white precipitate occurred, but in that in which the lead had been exposed above the surface of the water, a far greater quantity than in the one where the lead had been covered with the water; and he concludes from this experiment, that although it is not necessary that the lead should be exposed above the surface of the water for the action to take place, still by offering a passage to the gases contained in the atmosphere it accelerates it.

The author observes, " I have before stated, Dr. Christison does not describe the method by which he performed his experiment on the non-solubility of lead in pure distilled water; and although I agree with him as to the fact, as I found some difficulty in ascertaining it, I will describe the process I followed. I found that on boiling pure distilled water so as to deprive it of all atmospheric air, that when it had regained its former temperature, and was placed in a well-stoppered bottle with a piece of lead, the bottle being perfectly full, although no action was apparent, and the lead remained almost as bright as when first placed in the bottle, yet if a little hydrosulphuric acid was added to the water, it instinctly became of a brown color, showing the presence of lead, the water having on cooling absorbed sufficient atmospheric air to act on the lead. If, on the contrary, the water was placed in the bottle when warm, and the lead immediately added, and the bottle stoppered, on cooling a vacuum was formed, which it was impossible to maintain, and the lead was acted upon. I therefore repeated the last experiment, but took the precaution, when the bottle was quite full and no vacuum had formed, to plunge the stopper under mercury, and to pour water above the mercury. The experiment was allowed to remain for some months; the lead retained its original brightness; and on breaking off the neck of the bottle, it being impossible on account of the vacuum to take out the stopper, not the slightest effect was produced on the liquid by hydrosulphuric acid, thus proving that pure water, without the presence of air, has no action on lead.

"From my experiments I am led to the same conclusion as Colonel Yorke, as to the manner of the formation of the white precipitate; in fact, I have obtained small masses of crystalline scales, which have formed on the surface of lead, which have dissolved without the slightest effervescence in acetic acid. I do not think, however, any fixed composition can be assigned to this substance, as on repeating his experiment of drying it under the air-pump upon two different specimens, one of which had been kept some years, and the other only a few weeks, in the former a much larger amount of carbonic acid was found than in the latter, showing that the precipitate had no definite composition, but that it depended, as to the quantity of carbonic acid, on the length of time it had been exposed in the solution.

"As to the existence of either of the salts of lead mentioned in a soluble state, I must confess that I differ with the two authorities I have named, and believe that what they consider to have dissolved is merely the hydrated oxide of lead held in a state of mechanical suspension, and for the following reasons:—I found that, in repeating an experiment of Colonel Yorke's, that of precipitating hydrated oxide of lead and washing it with warm distilled water, that the filtered liquor gave a brown precipitate with hydrosulphuric acid, after all the soluble salts formed had been washed away; but that on refiltering a portion of it through more than one filter, not the slightest discoloration was given to the liquor by the test; and as Colonel Yorke considered that the soluble salt was the hydrated oxide, a greater quantity of which would exist, as already shown, at the commencement of the action of the lead on the water, I placed a piece of lead in distilled water, and carefully tested the filtered liquor daily, for some weeks, with hydrosulphuric acid, but in no case could I find the slightest discoloration given to it. Now as the test is so delicate as to be capable of discovering, according to Pfaff, a 100,000th part of the metal in solution, if, as Colonel Yorke states, a 10,000th part of the oxide is held in solution, the test would of course have distinctly shown it.

"Dr. Christison considering that the action of the formation of a soluble salt of lead was due to the carbonate of lead becoming converted into bicarbonate by long exposure, I tested the liquid from one of the experiments I have before mentioned, when the lead in distilled water had been exposed to the action of the atmosphere for six years, and could not detect the slightest discoloration after the solution had been carefully filtered. I therefore conclude from these experiments, and I believe Dr. Thomson has previously arrived at the same result, that no soluble salt of lead is formed by the action of atmospheric air on lead in distilled water."

As to the last question, "to which of the salts contained in river-water the non-formation of the white precipitate is due," the author states that it is the sulphate of lime, and considers that the chloride of sodium, which has been generally supposed to be capable of exercising this preservative power, does not possess it, on account of its forming when decomposed a salt of lead partly soluble.

In conclusion, he remarks that the non-action of rain-water which had fallen, after a long continuance of dry weather, on lead, is probably due to the small amount of carbonate of ammonia which is contained in atmospheric air. *London Chemical Gazette.*

ART. VI.—ON THE LIQUEFACTION OF GASES.

BY PROFESSOR FARADAY.

THE author, in a letter to M. Dumas, gives the following account of his mode of experimenting :—

I sought in the first place to obtain a very low temperature, and employed for this purpose Thilorier's bath of solid carbonic acid and æther, placing it however under the recipient of an air-pump. By maintaining a constant vacuum, I lowered the temperature to such a degree, that the carbonic acid of the bath was not more volatile than water at the temperature of 86°, for the barometer of the air pump stood at 28.2 inches, the external barometer being at 29.4.

This arrangement made, I joined together, by means of corks and stop-cocks, some small glass and copper tubes, so that with the aid of two pumps I was able to subject various gases to a pressure of 40 atmospheres, and at the same time to submit them to the intense cold obtained under the air-pump, and to examine the resulting effects. As I expected, the cold produced several results which pressure alone would never have done, and principally in the solidification of bodies ordinarily gaseous. The following is a sketch of the various results :—

Olefiant gas was condensed to a beautiful colorless transparent liquid, but it did not solidify ; it dissolves the resinous, bituminous and oily bodies.

Pure *hydriodic acid* may be obtained either in the solid or liquid state. Solid hydriodic acid is very clear, colorless and transparent; generally several fissures traverse the mass; it greatly resembles ice.

Hydrobromic acid may also be obtained either as a limpid and colorless liquid, or as a clear transparent solid.

Both these acids require a very careful distillation in closed vessels and under great pressure, to be obtained pure and colorless.

Fluosilicic acid was condensed to the liquid state, but it is requisite to operate at the lowest temperature. It is extremely liquid and mobile, like hot æther ; it then produces a pressure of about 9 atmospheres, and gives no sign of solidification. It is transparent and colorless.

Fluoboric acid and *phosphuretted hydrogen* presented some results of condensation.

Hydrochloric acid liquifies readily at less than 1 atmosphere of pressure, but it does not solidify.

Sulphurous acid freezes immediately, as was to be expected.

Sulphuretted hydrogen becomes solid, and then forms a white, transparent, crystalline mass, bearing greater resemblance to solid nitrate of ammonia or to camphor, than to ice.

Carbonic acid, when it passes from the liquid to the solid state without being dispersed in the form of snow, constitutes a very beautiful substance, transparent like crystal, so that for some time I doubted whether the tube which contained it was empty or full; and I was even obliged, in order to ascertain the presence of the solid body, to melt a portion of it. Solid carbonic acid exerts a pressure of 6 atmospheres, which proves how readily liquid carbonic acid ought to become solid when allowed to escape into the free air.

Oxide of chlorine is a beautiful, orange-red, very friable, crystalline substance. It exhibits no trace of explosive power.

Protoxide of nitrogen is one of the gases which I had formerly condensed. I have seen in the journals that M. Natterer has repeated my experiments with a compression-pump, and that he has obtained the liquid in the open air. I have likewise condensed it to a liquid by means of my pump, but I have moreover solidified it by means of the cold bath. It then forms a beautiful transparent or colorless crystalline body, but in this state the pressure of its vapor does not amount to that of 1 atmosphere; and this result is confirmed by another experiment, in which, having opened a vessel containing this liquid, a portion evaporated, cooled the remainder, but did not solidify it. The cold produced by this evaporation is very intense, which was proved by placing the tube and its contents in a bath of solid carbonic acid and æther in the air. This bath, which instantly freezes mercury, behaved like a vessel filled with hot liquor, and immediately caused the protoxide of nitrogen to boil violently. It is therefore my intention to employ the liquid protoxide of nitrogen for some new experiments on hydrogen, oxygen and nitrogen; for on placing a bath of this liquid protoxide in the receiver of an air-pump, and expelling the air and the gas, we are able to place the bath of the protoxide relatively to that of the carbonic acid *in vacuo*, in the same relation that the two baths observe in the air.

Cyanogen freezes, as was already proved by Bussy.

Perfectly pure and dry *ammonia* may be obtained as a transparent, crystalline white substance, heavier than liquid ammonia, and diffusing very little odour, from the weak tension of its vapor at this temperature.

Arseniuretted hydrogen and *chlorine* do not pass from the liquid to the solid state.

Alcohol becomes thick like cold oil, but does not crystallize any more than *caoutchene, camphene* and *oil of turpentine,* but these bodies become viscid.

Binoxide of nitrogen and *oxide of carbon* did not exhibit the least sign of liquefaction at the lowest temperature, and at a pressure of 30 to 35 atmospheres.

While making these general observations, I have determined several numbers relative to the point of fusion of these various gases and their tension at different temperatures. The numbers will be given in the memoir which I am preparing on this subject, and in which I hope to have something new to say respecting the state which oxygen, nitrogen or hydrogen may affect in passing to the liquid state. Will this latter body present itself in the metallic form, as you think? Will nitrogen prove to be a metal, or retain its place among the non-metallic bodies? This, experience will show.—*Ibid, from Ann. de Chim. et de Phys.*

ART. VII.—EXAMINATION OF JALAP RESIN.

BY G. A. KAISER.

Besides the ordinary *Jalapa tuberosa* or *ponderosa*, which occurs from the size of a nut to that of a fist, and which is derived from *Ipomœa Schiedeana*, Zuc., there is also met with at present another kind derived from *Ipomœa orizabensis*, which is paler, more fibrous, has a fainter smell and taste, and is known by the name of *Rad. Jalapæ fusiformis s. lævis* (*Stipites Jalapæ*). The resins from both agree, and are thereby distinguished from all other resins with which they might possibly be adulterated, in their being gradually dissolved by concentrated sulphuric acid, and depositing after some hours a brown smeary resin. Both are however essentially distinct. The resin from *Ipom. orizabensis* is simple and entirely soluble in æther; this was examined by Johnston, and found to be $C^{40} H^{34} O^{18}$; the author found $C^{42} H^{34} O^{18}$, and calls it *Pararhodeoretine.* The resin from *Ipom. Schiedeana* consists, on the contrary, of a soft resin soluble in æther and a resin insoluble in æther, which the author terms *Rhodeoretine*, which is identical with the Jalapine of Herberger and Buchner, but does not possess the properties of a base, but those of an acid, is decomposed by concentrated acids like salicine into grape-sugar and *Rhodeoretinole* $= C^{42} H^{35} O^{20}$, and gives an hydrate and various salts. This resin has likewise been examined by Cadet de Gassicourt and Gœbel.

Rhodeoretine : Preparation.—The root of *Ipom. Schiedeana* was treated with alcohol of 0.863 spec. grav., the extract mixed with water, and the alcohol removed by distillation; the dark brown resin was separated, boiled with water, and then washed with hot water as long as anything was removed, upon which it was again dissolved in alcohol of 0.863 spec. grav., and the solution digested two or three times with washed animal charcoal until it acquired a bright, faint, wine-yellow color; the filtered alcoholic solution was then diluted with water and the alcohol distilled off. The resin obtained had a slight yellowish tint, and was of the consistence of Venetian turpentine, was boiled with distilled water, and treated several times with water, which takes up a considerable quantity of resin. Thus purified and evaporated to dryness in a water-bath, the resin formed a yellowish-white brittle mass, which possessed the well-known smell of jalap. The dry resin was boiled in a retort with æther as long as anything was removed. Finally, the resin was re-dissolved in a little alcohol, and then precipitated with æther. In this manner a colorless, perfectly transparent resin was obtained, a thin dry layer of which on a glass plate could scarcely be distinguished by the eye. The resin was then evaporated in a water-bath to dryness.

When pulverized it forms a nearly white powder, without smell or taste, insoluble in water and æther, but very readily soluble in alcohol. It is thrown down of a white colour from this alcoholic solution by water; the precipitate dissolves entirely in ammonia and acetic acid. The alcoholic solution has a faint acid reaction, dissolves but sparingly in cold potash, soda and the carbonate alkalies, but entirely on the application of heat. From these solutions acids do not precipitate it any longer; it dissolves entirely in cold concentrated ammonia with a light brownish color; on expelling the excess of ammonia by heat a neutral solution is obtained, which may be mixed in all proportions with alcohol and water. The solution of this neutral salt of ammonia is not precipitated by nitrate of silver, neutral acetate of lead, chloride of barium or sulphate of copper; a flocculent precipitate is obtained only by means of basic acetate of lead. The solutions of the potash and soda salt behave towards these reagents just as the ammonia salt. Since the above method would not suffice to obtain a combination of the resin with earths and metallic oxides in the solid form, an alcoholic solution of the resin was boiled with hydrate of lime and magnesia; but none of the oxides could be detected in the filtered liquid. The resin was thrown down unaltered by water, nor was there in the residue any combination of the resin with the bases. Upon this an alcoholic solution was mixed with water till the resin began to separate; it was then boiled with oxide of lead, hydrate of lime and magnesia, but no salt could be obtained in a solid state even in this manner. If a solution of the ammonia salt is boiled with hydrate of lime until no more ammonia is given off, a lime salt is formed, soluble in water and alcohol, but from which no resin can be separated by muriatic acid. Treated in the same manner with hydrate of barytes, a salt readily soluble in water and alcohol is likewise obtained, but from which no resin could be separated by means of acids. Acetic acid dissolves the resin with ease; concentrated nitric acid dissolves it in the cold unaltered; when ammonia is added it again separates; cold dilute nitric acid does not dissolve it; on the application of heat it is dissolved with decomposition; it is insoluble in cold dilute, but is decomposed by concentrated sulphuric acid; moistened with it on a watch-glass, each particle becomes, in about ten minutes, of a beautiful carmine red, and dissolves; the liquid acquires a darker colour, and after some hours a brownish-black resinous body separates. Heated on platinum-foil, the resin first melts, and becomes brown, with evolution of a peculiar empyreumatic odour, and then burns with a bright, somewhat smokey flame, leaving behind a porous shining cinder, which at last disappears entirely. At 302° it melts to a bright yellow transparent mass, without however parting with any more water.

The pure resin was pulverized, dried at 212°, and burnt with chromate of lead. It furnished—

			Equiv.	Calculated.
Carbon	56.49	56.35	42	56.66
Hydrogen	77.94	7.89	35	7.78
Oxygen	35.5	35.76	20	35.56

Salt of Ammonia.—Some ammonia was poured over a quantity of the resin, and digested with it until it was entirely dissolved. The liquid, which had a somewhat brownish color, was warmed until the excess of ammonia had been removed and the liquid had become perfectly neutral. On evaporation in the water-bath, the combination formed a brownish resinous mass, which was very readily soluble in alcohol and water; it possessed no odour, a bitter taste, and on treating it with potash it liberated ammonia.

Lead Salt.—A solution of the ammonia salt in water was mixed with some basic acetate of lead as long as any precipitate resulted, and the white flocculent deposit obtained carefully washed with water. Dried and pulverized it forms a powder.

Hydro-rhodeoretine.—To obtain the acid combined with the oxide of lead, the lead salt, carefully washed, was suspended in distilled water, and a current of sulphuretted hydrogen gas passed through it, frequently stirring, until it was entirely decomposed. The liquid filtered from the sulphuret of lead was transparent, and afforded on evaporation in the water-bath a slightly brownish resinous mass, possessing the following properties:—When dry it resembles externally the original resin, is quite as brittle and as easily pulverized; it dissolves readily in water and in alcohol, but is insoluble in æther, has no odour, but a tolerably strong, pure bitter taste. It melts on platinum foil, and then burns, giving off the same odour and the same bright, somewhat smoky flame, as rhodeoretine, leaving behind a porous cinder, which is consumed without residue. The aqueous solution has an acid reaction, and is neither rendered turbid by solutions of neutral metallic salts nor by those of the alkaline earths. The original lead salt is obtained only with basic acetate of lead, or with the neutral acetate and the addition of ammonia. It likewise dissolves in alkalies and carbonate alkalies, and forms the same salts as those obtained by dissolving the original resin in alkalies. It does not crystallize either from the alcoholic or from the aqueous solution; it dissolves in acetic acid and in cold nitric acid without decomposition. Water and ammonia do not again precipitate it. Like rhodeoretine it becomes colored of a beautiful carmine red after a few minutes with concentrated sulphuric acid; and it likewise deposits after decomposition a brownish-black resinous mass, with the same peculiar odour; at 212° it cakes together; some few degrees above this temperature it melts to a yellow fluid. The pulverized acid, dried at 212°, was burnt with chromate of lead, and afforded—

Carbon	55.10	55.16	42	= 3185.8	55.54
Hydrogen	8.28	8.39	36	449.3	7.83
Oxygen	36.62	36.45	21	2100.0	36.63

Potash Salt.—For the preparation of this salt a quantity of rhodeoretine was conveyed into a boiling solution of carbonate of potash, in which it dissolved tolerably easy with a yellow color. The solution was then evaporated to dryness in the water-bath, and the dry mass extracted with absolute alcohol. The potash compound dissolved in it, and the excess of carbonate of potash remained undissolved. The alcoholic solution was evaporated to dryness; the dry pulverized salt had a faint yellowish color, and dissolved both in alcohol and readily in water; the aqueous solution had a bitter taste and an agreeable quince-like odour. Heated on platinum foil, it burnt with the same bright flame as rhodeoretine.

Barytes Salt.—A certain quantity of hydro-rhodeoretine was dissolved in water, a slight excess of barytes water added to the solution, and the whole then evaporated until the excess of barytes was converted into carbonate, and the liquid no longer had an alkaline reaction; it was then filtered and evaporated to dryness in the water-bath. Dry and pulverized, the salt forms an almost perfectly white powder, which is easily soluble in water and alcohol, but is precipitated from the aqueous solution by absolute alcohol. It has no odour, but a bitter taste; heated on platinum, it first melts, and then burns with a bright flame, diffusing the same odour as rhodeoretine. It melts at 221°. The analyses of the salts gave the following results :—

Lead Salt.

Carbon,	36.95	37.31	42	=	3185.87	37.37
Hydrogen,	5.32	5.40	36		449.3	5.27
Oxygen,	25.29	24.85	21		2100.0	24.65
Oxide of lead,	32.44	32.44	2		2789.0	32.71
					8524.17	

Barytes Salt.

Carbon,	51.11	50.94	84	=	6371.7	51.27
Hydrogen,	7.55	7.54	72		898.6	7.23
Oxygen,	33.71	33.89	42		4200.0	33.01
Barytes,	7.63	7.63	1		956.9	7.69
					12427.2	

Potash Salt.

Carbon,	53.49	53.37	126	=	9557.6	53.70
Hydrogen,	7.78	7.66	108		1347.9	7.57
Oxygen,	35.63	35.60	63		6300.0	35.42
Potash,	3.37	3.37	1		589.9	3.31
					17795.4	

Decomposition of Rhodeoretine by Acids.—A quantity of rhodeoretine was dissolved in absolute alcohol, and dry hydrochloric acid gas passed through the solution as long as any was absorbed. In this operation it became of a dark reddish-yellow color. The solution was corked and set aside for ten days, when it had become considerably darker and opake in mass. Mixed with water, a dark yellow oily liquid separated, which had an agreeable smell and dissolved in æther. The entire liquid was mixed with water, and then shaken with æther, which took up the oily liquid, acquiring a dark yellow color; the remaining alcoholic solution continued of a dark yellow-red color. The æthereal solution was washed with water, to separate the hydrochloric acid, and then exposed to the air. A dark brownish-yellow, thick, oily fluid separated on evaporation of the æther, which possessed a strong and not disagreeable odour. The neutral liquid volatilized with difficulty, but entirely, on exposure to heat, and burnt with a red flame. Boiled with solution of caustic potash, no action resulted; cold concentrated sulphuric acid was likewise without any effect upon it. The liquid was placed over sulphuric acid for some days, and then submitted to analysis, with the following results:—

Carbon,	66.95	66.65	30	67.51
Hydrogen,	10.67		23	8.53
Oxygen,	22.38		8	23,96

The author has given the name of *Rhodeoretinol* to this body, from its origin and consistence.

The acid liquid separated from the rhodeoretinol was saturated with carbonate of lead, the filtered liquid evaporated to dryness in the water-bath, and extracted with absolute alcohol. A viscid transparent mass was obtained, which had a sweetish taste, dissolved in water and alcohol, burnt on platinum foil, giving off the well-known odour of burnt sugar; and when warmed with potash and sulphate of copper, exhibited the characteristic reaction of grape-sugar by the reduction of the oxide of copper, gave the characteristic crystals with common salt, and finally, on being dissolved in water and brought into contact with yeast, passed into vinous fermentation. It is evident from these reactions that this substance is identical with grape-sugar, &c.

The author made the same experiment with a solution of hydro-rhodeoretine in absolute alcohol and hydrochloric acid gas, as with rhodeoretine. The solution acquired a dark yellow color, and on mixing with water white flakes separated, which on being magnified exhibited the appearance of minute coherent drops of oil, and dissolved in æther. The æthereal solution, freed by washing with water from acid, gave on evaporation in the air a brown waxy mass, which possessed a similar odour to the rhodeoretinol. The acid solution, from which the substance had been removed by æther, likewise yielded, with excess of potash and sulphate of copper, the reaction of grape-sugar.

Resin soluble in Æther.—The æthereal extract of the resin, which was of a dark yellow color, was evaporated by exposure to the air, when a clear brownish-yellow liquid mass separated, which on solution in alcohol was thrown down by water as a brownish oily mass, which also separated any remaining portions of rhodeoretine. The mass, purified by being again dissolved in alcohol and precipitated with water, possessed the following properties:—It was strongly acid towards blue litmus-paper, left a grease-spot on paper, possessed a very strong disagreeable smell, resembling that of the jalap-root, and an irritating taste, and was insoluble in hydrochloric, nitric and acetic acids even on warming. It dissolves in an aqueous solution of potash or soda, and is separated unaltered by muriatic acid. The alcoholic solution is precipitated by an alcoholic solution of acetate of lead with a yellow color; it does not crystallize either from the æthereal or from the alcoholic solution, and remains, even after several months, still quite soft and smeary. Left in contact with water for some length of time, it is converted into a mass of prismatic acicular crystals, which adhere together, and even after several months form a smeary mass.

Pararhodeoretine.—A quantity of the accurately-determined root of *Ipomea orizabensis*, Pellet., was exhausted with alcohol, the extract mixed with water, and the alcohol removed by distillation; the resin so obtained was washed with hot water, again dissolved in alcohol and entirely decolorized by means of washed animal charcoal. The resin obtained by distilling off the alcohol, and boiling in water after desiccation in the water-bath, formed when pulverized a nearly white powder, which dissolved entirely in alcohol and æther to a transparent clear liquid. It is entirely dissolved by warm aqueous solutions of potash, soda, and the carbonate alkalies, and is separated by muriatic acid from these solutions in white flakes. Concentrated sulphuric acid dissolves it in the course of five to ten minutes with a beautiful purple-red color; after some time a brown smeary resin separates. It melts when heated on platinum foil, and burns when ignited with a bright, somewhat smoky flame, leaving a porous coal, which can be entirely consumed. It possesses neither smell nor taste, is very brittle and easily pulverized. The resin obtained by evaporating the alcoholic solution in the water-bath, and dried at 212°, gave on combustion with chromate of lead the following result:—

Carbon,	58.58	58.64	42	= 3185.9	58.88
Hydrogen,	8.01	8.13	34	424.3	7.84
Oxygen,	33.41	33.23	18	1800.0	33.28

According to Johnston, the resin of Scammony = $C^{40} H^{33} O^{20}$. The resins of the *Convolvulaceæ* abound, therefore, most in oxygen, and form by the soluble hydrorhodeoretine the transition from salicine and phloridzine. 7 equivalents starch ($C^{84} H^{70} O^{70}$) = 2 equiv. rhodeoretine + 30 O.

Chem. Gaz. from Liebig's Annalen.

ART. VIII.—ON LIMONE.

BY DR. C. SCHMIDT.

This substance, which was discovered by Bernays, in the pips of lemons and oranges, is probably contained in the seed of all the *Aurantiaceæ.* From the author's investigation it appears that it is not a base, and does not contain any nitrogen. It is obtained in the form of a white crystalline powder; its crystals belong to the rhombic system. This substance is very sparingly soluble in water, æther and ammonia, somewhat more in mineral acids, more easily in alcohol and acetic acid, but most readily in potash, from which solution it is precipitated unaltered by acids. Concentrated sulphuric acid dissolves it with a blood-red color, from which water precipitates it, as well as from the alcoholic and acetic solutions, unchanged; it is carbonized by heat. When neutralized with carbonate of barytes, no barytes remains in the solution. It crystallizes readily from acetic acid; the crystals are free from chemically combined acetic acid. The alcoholic solution has a neutral reaction; it neither affords precipitates with chloride of platinum nor with perchloride of mercury, with salts of lead nor with those of silver, potash, barytes and others (the latter must naturally be dissolved in alcohol, as otherwise the pure substance is precipitated by the water of the saline solution.) It can be heated to 302° without undergoing change, and without any remarkable loss in weight; at a higher temperature it suddenly becomes yellowish, and melts at 471° to a liquid of the same colour, which resembles a melting resin; it resolidifies to an amorphous mass, and even after several days does not present any trace of crystalline structure; it may, however, be dissolved in acetic acid by long digestion in the warmth, from which it crystallizes in the form and with the properties of the original unmelted substance.

The indifference of this substance towards oxidizing agents is remarkable; concentrated nitric acid dissolves it, especially with the assistance of a little heat; the solution is of a pale yellow, and even after long heating it is precipitated by water from the solution in an unaltered state. On boiling it with a concentrated solution of bichromate of potash it undergoes no change, nor with free chromic acid, *i. e.* sulphuric acid and chromate of potash, in which solution it floats unaltered even after boiling for several hours. The acetic solution has a strong bitter taste; however, it does not appear to produce any considerable physiological effects. 60 millegrammes, dissolved in acetic acid and taken early in the morning before breaking fast, produced no effect; nothing could be detected in the secretions. 25 millegrammes were given to a dog, and 10 millegrammes to a bird, but likewise without any effect.

The elementary composition proved the perfect identity of the substance prepared from lemon and orange pips, and gave as the mean of several analyses, in 100 parts—

Carbon,	66.09	42	66.17
Hydrogen,	6.55	25	6.55
Oxygen,	27.36	12	27.32

The formula is that of phloridzine, dried at 212° + 2 equiv. oxygen. Direct experiments, with reducing agents, such as sulphurous acid, hydrochloric acid, sulphuretted hydrogen, hydrogen in *statu nascenti*, and the electric current, afforded, however, by their negative results, the proof that this substance does not belong to the phloridzine series, especially as the characteristic decomposition of salicine by chromic acid was wanting. The combining weight could not be ascertained, since it was impossible to obtain combinations of this substance with other bodies.

Ibid, from Göttinger gel. Anz.

ART. IX.—ON THE ORGANIC ACIDS OF LACTUCA VIROSA AND SATIVA. By M. Köhnke.

Numerous doubts having been raised against the distinctness of the so-called lactucic acid of Pfaff; the author has endeavored to settle these, and has found that the fresh plant contains no oxalic acid, but *malic* and *succinic acids;* that, on the contrary, no succinic but oxalic acid occurs in the lactucarium. The author's experiments are as follows:—

Fresh entire plants of *Lactuca virosa* were cut into pieces, digested for several hours in warm water, boiled for a time, expressed and filtered, the solution precipitated with basic acetate of lead, the precipitate collected, washed, suspended while still moist in distilled water, and decomposed by sulphuretted hydrogen. The colored acid liquid obtained was evaporated at a moderate heat; it finally congealed to a thick jelly. It had been ascertained by previous experiment that the acid was soluble in spirit, the gelatinous substance insoluble; the mass was therefore treated with strong alcohol and warmed, when the latter substance separated in whitish lumps. This substance, after removal, dissolved with difficulty in water, very readily in dilute muriatic acid, from which solution it was thrown down as a voluminous precipitate on saturating the acid with caustic ammonia. It had a horny appearance when dried, a dirty yellowish color, and was now perfectly insoluble in water, and very sparingly soluble in dilute muriatic acid.

The acid spirituous solution, which still appeared much colored, and but little of which color could be removed by treatment with purified animal charcoal, was mixed with water, the alcohol distilled off at a very gentle heat, and more water added to the residue, which was then saturated with carbonate of ammonia, which considerably decolorized the liquid and removed some carbonate of lime; on filtration and evaporation an acid crystalline salt of ammonia was obtained, which was procured in very white masses by frequent recrystallization with addition of caustic ammonia.

The salt was dissolved in water, again precipitated with basic acetate of lead, the precipitate collected, edulcorated and decomposed with sulphuretted hydrogen, upon which the clear acid was evaporated to a certain degree, and then exposed to the heat of summer. In the course of 14 days numerous crystals had formed, which in 14 days more, during which time the solution had evaporated down to about half, increased considerably in quantity and size, and after careful collection and washing with a little cold water appeared as prismatic trilateral columns with obtuse terminations; those, on the contrary, which were applied to the side of the basin resembled butterflies' wings; the latter crystals, dissolved in spirit and crystallized, then dissolved in water and recrystallized, formed colorless, regular, prismatic, tabular crystals.

The residuous acid liquid was mixed with water and with sulphuret of barium, and finally saturated with some carbonate of barytes, the soluble salt of barytes carefully decomposed with dilute sulphuric acid, and the acid obtained evaporated. It could not be obtained in a crystalline state, but when dried for several weeks at a moderate heat formed a white efflorescent salt. This dried acid, heated in a glass tube, was decomposed with effervescence and evolution of irritating acid vapors, which were partly deposited on the cold sides of the tube in the form of a sublimate (maleic acid) and the residue consisted of a white acid crust (fumaric acid.) It was consequently *malic acid.* For further confirmation the acid was dissolved in water, and chloride of potassium added to the solution, and to another sample, lime-water; both, however, without producing any change. A solution of acetate of lead immediately formed a caseous precipitate, which melted like a resin in boiling water.

The precipitate obtained by saturating with sulphuret of barium and carbonate of barytes was collected and treated with dilute sulphuric acid, filtered, an excess of milk of lime added to the acid fluid, and filtered boiling. On evaporating the filtered solution some small crystals separated, characterized by their being decomposed when heated in a glass tube with evolution of vapors, which excited coughing, and with the deposition of an acid sublimate. The residue from the treatment with milk of lime behaved therefore like citrate of lime, from which moreover a small quantity of pure citric acid was obtained in a crystalline state. For this purpose the lime salt was carefully decomposed with sulphuric acid, the filtered solution having however been previously examined for tartaric and oxalic acids. Chloride of calcium and chloride of ammonium added to a portion saturated with caustic ammonia produced no turbidness; a portion to which a slight excess of caustic ammonia had been added, and then a solution of gypsum, exhibited, even after a long time, no change; a sample rendered neutral, and boiled with chloride of calcium and caustic ammonia, immediately afforded a white pulverulent precipitate.

The acid first obtained in prismatic tabular crystals was now submitted to a more accurate examination, and accordingly heated in a glass tube; it was entirely volatile, with evolution of abundant vapors, which excited coughing, and deposition of a sublimate resembling that of the lime salt already mentioned; treated with chlorine and nitric acid, the crystals again afforded the same acid.

The acid required 2 parts alcohol, 3 parts hot and 24 parts cold water, for solution.

A sample was now dissolved in water, and tested with the reagents mentioned by Pfaff. It immediately caused a considerable brownish turbidness in neutral protosulphate of iron; a solution of acetate of magnesia produced no change, which was likewise the case with sulphate or acetate of copper, which however were precipitated of a light blue color, when the acid was neutralized with caustic ammonia. The acid, dissolved in water and neutralized with caustic ammonia, was employed for the following reactions:—Acetate of barytes and solution of lime, as well as solution of gypsum, produced no change; acetate of lead, a precipitate which was soluble in the free acid, in dilute nitric acid, and in an excess of the precipitant; nitrate of silver, a pulverulent precipitate soluble in caustic ammonia and nitric acid; solution of corrosive sublimate, no change; but with solution of the protonitrate of mercury, an abundant caseous precipitate; perchloride of iron, a dark brown voluminous precipitate; and acetate of zinc, a white precipitate, which was soluble in much hot water.

From these preliminary tests, there can be scarcely any doubt that the peculiar acid of the plant is *succinic acid.*

Lactuca sativa was treated in the same manner as *Lactuca virosa,* and curiously enough yielded the same results, except as to the amount of succinic and malic acids. 100 lbs. of the fresh *Lactuca sativa* gave 122 grs. of succinic acid and 11 drms. of dried malic acid; 50 lbs. of fresh *Lactuca virosa* yielded 28 grs. pure crystallized succinic acid and 3 drms. of dried malic acid.

An *Extractum Lactucæ virosæ* afforded, when treated in a similar manner, on an average 1 gr. of succinic acid per ounce. In this examination the tests for oxalic acid were likewise repeated, but with a negative result.

According to the most recent analysis, an oxalate is constantly contained in lactucarium; the author convinced himself of its presence in some *Lactucarium anglicum,* procured in commerce, which on extraction with boiling water, treating the solution with basic acetate of lead, and decomposing the lead salt with sulphuretted hydrogen, yielded the acid in considerable quantity and in beautiful prismatic needles, and likewise citric and malic acids; no succinic acid however could be detected in the lactucarium, of which two ounces were employed.

To ascertain, moreover, whether the oxalic acid probably existed in the *Lactuca* as oxalate of lime, and could consequently not be extracted by water, the following experiments were made on some pounds of the dried plant *Lactuca sativa,* collected in the flowering season. The plant, cut into small pieces, was treated with warm water containing nitric acid, then expressed, filtered, and the acid saturated with carbonate of ammonia, then boiled, filtered, precipitated with basic acetate of lead, the precipitate washed and decomposed with sulphuretted hydrogen, which operation was again repeated; finally, the colorless solution was evaporated and set aside in a warm place. After a considerable length of time a crystalline mixture was obtained in a syrupy fluid, which collected carefully, brought on to bibulous paper and recrystallized, gave prismatic crystals.

A portion of the acid, saturated with caustic ammonia, did not afford any oxalic acid, but only succinic and citric acids, which yielded, on separation by means of lime-milk and decomposition of the lime salts, pure crystallized succinic and citric acids. The quantity of succinic acid which was obtained this time was considerably greater than previously.—*Ibid, from Archiv. der Pharm.*

ART. X.—ANALYSIS OF ERGOT.

BY M. SEGRIP.

Fatty oil, thick, very fluid at + 25° of a beautiful yellow,	34.50
Amidine,	2.75
Albumen,	1.00
Inulin,	2.25
Gum,	2.50
Uncrystallizable sugar,	1.25
Resin, very brown,	2.75
Fungin,	3.50
Vegeto-animal matter,	13.50
Osmazome,	0.75
Fat acids,	0.50
Coloring Principles 1. Reddish brown, made violet by an alkali, rose-yellow by an acid, insoluble in alcohol. 2. Brown, yellow by ammonia, not colored by acids, soluble in alcohol,	0.50
Odorous principle not isolated,	
Fungate of potassa,	2.25
Chloride of sodium,	0.50
Sulphate of lime, Sulphate of magnesia,	0.50
Subphosphate of lime,	1.25
Oxide of iron,	0.25
Silica,	0.15
Water,	0.15
Loss,	2.35
	100.00

M. Segrip has essayed the therapeutic action of some of these products, and the results at which he has arrived, differ from those that have been announced by other experimenters. Thus he has been able to administer a large dose of the oil of ergot to a young animal, without any apparent effect being visible. The alcoholic extract exhibited the same inefficiency. He has not, moreover, found the same crystalline matter, *crystine*, which has been announced by Mr. Vallet, and regrets that the author has not indicated the method by which he obtained it.

Journ. de Pharmacie.

The point of interest in this analysis, is the detection of that peculiar principle, *Fungin*, which is the characteristic of the *Fungi tribe* of vegetables, and which corroborates the views of those naturalists, who regard the origin of Ergot as fungous.—*Ed. Amer. Journ. Pharm.*

ART. XI.—ON THE CONDENSATION OF NITROGEN BY VEGETABLE MOULD, AND ON THE NUTRITIVE POWER OF THE SOIL.

BY PROFESSOR MULDER.

Mulder does not admit with Liebig, that the whole of the nitrogen of unmanured soil can be derived from the ammonia contained in the atmosphere. Even supposing, what has not been proved, that 1 lb. of rain-water contained ¼ gr. of ammonia, this quantity could never occur except at the commencement of a rain, and the water subsequently falling could contain scarcely any or no ammonia. The author, in his researches on the constituents of mould, has been led to quite a different mode of accounting for the nitrogen of the soil, as will be seen from the memoir in our last number. From that it is evident that ammonia is probably first formed, out of this nitric acid, and from the latter, under the influence of the hydrogen liberated at the formation of humous substances, ammonia, which remains in combination with the humic acid. The possibility of a condensation of the free nitrogen of the atmosphere to ammonia results from the following experiments:—

When clean, fresh iron filings are placed in a flask moistened with a little water, and red litmus-paper suspended in it, the paper in the closed flask becomes in a few days blue.*

On the 10th of May some freshly ignited powdered charcoal was conveyed into a glass flask with hot distilled water, so that about seven-eighths of the flask remained filled with atmospheric air. On the 1st of August the charcoal was examined; it was distilled with pure caustic potash, and gave perceptible traces of ammonia. The water with which the charcoal was washed remained perfectly colorless.

Humic acid, prepared from sugar, was moistened with a little water (both free from ammonia,) and left for six months in a closed flask; upon being then treated with potash, the substance disengaged a considerable quantity of ammonia.

Well-ignited charcoal was conveyed, on the 10th of May, while hot, into a glass flask with ground stopper, sprinkled with potato-starch and moistened with water. It was examined on the 1st of August; a disengagement of gas had commenced, for on touching the stopper it was thrown out of the neck. The mixture had a very distinct smell of cheese. A portion, distilled with potash, gave abundant proofs of ammonia, far more than the charcoal alone. Washed with water, the liquid passed colorless through the filter.

Gum arabic, mixed in the same manner with charcoal,

---

*According to Berzelius this results from the decomposition of the coloring substance, azolitmine, when kept in a moist state. *Report* for 1844, p. 53.—Ed. *Chem. Gaz.*

gave the same result, as did likewise pure cane and milk sugar. The quantity of ammonia disengaged from the latter was considerable.

On the 10th of May a solution of pure milk-sugar in distilled water was placed in a glass-stoppered bottle, so that seven-eighths of the bottle remained filled with atmospheric air. A similar experiment was made with pure cane-sugar. Both exhibited, after a few days, mould plants, which increased rapidly, especially in the milk-sugar. On the 1st of August they were removed from the solution, submitted to dry distillation, and the distillate tested for ammonia; it was found to contain a considerable quantity.

Now, since the circumstances in which the soil is placed are perfectly identical with those to which, in the above experiments, the charcoal (and humic acid) was exposed, there must actually take place in the soil an incessant formation of ammonia from the nitrogen of the atmosphere.

The form of the mould plants from milk-sugar (few are developed from cane-sugar) is closely allied to that of *Mycoderma Vini.* These plants are said to make place for others; and if the experiment be carried on sufficiently long, one generation follows the other. The organization of plants of the simplest kind consists in the formation of cellulose on the one hand, and in proteine on the other. These two substances are absolutely necessary for the formation of the simplest cell plants. Exhausted with acetic acid, the plant developed from milk-sugar yields a liquid, in which proteine may be distinctly proved by means of ferrocyanide of potassium. The solution of the milk-sugar had remained perfectly clear in this experiment, and the plants formed in this clear solution in great number. No gases were disengaged. The cellulose therefore necessarily originates from the milk-sugar by mere separation of water.

The origin of the proteine combined with the cellulose cannot be clearly proved.

These experiments may be multiplied in the most simple manner. All vegetable acids, and many of the indifferent substances, afford mould plants in larger or smaller quantity. Starch, above all, deserves attention in this respect. Arrowroot starch, preserved in pure water in a closed flask with air, very soon becomes turbid and opake, and forms a white precipitate. Mulder never observed during two months and a half mould form *at the top*, but in quantity *in* the mass itself, and then likewise on the surface. According to De Saussure, there originates from starch which has been exposed to the air or preserved in some bottles with air, after a few months, a mixture of sugar, gum, &c., and what in the present case deserves especial attention, a substance which he calls *ligneux amylacè*. This *ligneux amylacè* is cellulose combined with a little proteine, that is, a mould plant. De Saussure found from 4.4 to 10.53 per cent. in the starch employed. *Ligneux amylacè*, or mould plants, which afforded very considerable traces of ammonia, were likewise obtained from potato-flour that had been preserved in a close flask with pure water and pure atmospheric air for two months.

The influence of other bodies on the condensation of nitrogen to ammonia in the soil is of great importance. The nascent hydrogen which is set free from the decomposed organic substances binds the nitrogen of the atmosphere, just as iron filings and water form ammonia with the nitrogen of the atmosphere. A mixture of powdered charcoal with one-hundredth wood ashes was placed in two glass vessels, and ulmic acid, prepared from sugar, conveyed into one; both were exposed to an atmosphere free from ammonia. Brown beans were placed in the first, and white beans in the other; they were then sprinkled with distilled water, perfectly free from ammonia, and kept moist. The development and growth of the plants were extremely different in the two vessels; those in the ulmic acid vegetated powerfully, the others remained far behind. After twenty-four days they were taken out, the roots carefully freed from the charcoal with water, then dried and weighed. The residuary charcoal and the charcoal mixed with humic acid afforded, on distillation with potash, a considerable quantity of ammonia.

Three white beans, dried at 212°, weighed 1.465; three brown beans, 1.277; three plants of the brown beans, which had grown in charcoal and ash only, dried at 212°, weighed 1.772; three of the white beans, which had grown in charcoal, ash and ulmic acid, 4.167. This experiment, therefore (and we shall return to it presently,) proves the nutritive power of the ulmic acid for the plants. The three white and the three brown beans were filed to a powder, and the plants of both treated in the same manner. The amount of ash was as follows:—

0.488 white beans, dried at 212°, yielded 0.023 ash.
0.633 of the white bean plants, 0.043.
0.403 of brown beans, 0.015.
0.605 of the plants of the latter, 0.055.

The amount of nitrogen, on the contrary, was—

	White beans.	Nitrogen.	Brown beans.	Nitrogen.
Beans	1.465	50 CbC	1.277	27 CbC
Plants	4167	160 CbC	1.772	54 CbC

Three white beans, therefore, in becoming plants in charcoal, ulmic acid and ash, had taken up more than thrice the amount of nitrogen; three brown beans in charcoal exactly twice the quantity.

It is a difficult matter to ascertain whether the organic constituents of the soil are absorbed as such by the plants. This difficulty arises principally from the circumstance of its being impossible to present the same quantity of nutriment to the plants submitted to examination; and with too large or too small a quantity results are obtained between which no comparison can be made.

Several glasses of the same size were arranged side by side in an uninhabited room, exposed to no exhalations; some coarse well-washed sand was placed in the first five, and into all the other series of five a mixture of the same sand with 1 per cent. of common wood-ashes; and, moreover, in the second five, 5 per cent. of a mixture of different constituents of the soil, or of substances which it was interesting to examine. The substances were sprinkled with pure distilled water and kept moist.

In each series of five were planted,—1st, small brown beans; 2d, white beans; 3d, green peas; 4th, barley; 5th, oats.

After a month, from the 16th of May to the 16th of June, the following was the result of the development of the above seed:—

1. *Sand and Rain-water.*—Seed came up very sparingly, the plants scarcely a hand's span high, nearly all faded.

2. *Sand, Ashes and Rain-water.*—1st, did not germinate; 2d, very sparingly; 3d, tolerably well developed; 4th, very poor; 5th, somewhat better, but still very weak.

3. *Sand, Ashes, Ulmic Acid from Sugar, and distilled Water.*—1st, poorly; 2d, tolerably well; 3d, very well; 4th, did not come up; 5th, very well.

4. *Sand, Ashes, Apocrenate of Ammonia prepared from Sugar and distilled Water.*—None succeeded except No. 5, and this but very badly.

5. *Sand, Ashes, Humate of Ammonia from Garden Earth (Ammoniacal Extract of Humus,) distilled Water.*—None came up.

6. *Sand, Ashes, Humic Acid from Garden Earth, and distilled Water.*—1st, very beautifully developed; 2d, none came up; 3d, imperfectly developed; 4th, none came up; 5th, tolerably well developed.

7. *Sand, Ashes, Aqueous Extract of Humus, and distilled Water.*—1st, 2d, 3d and 5th, none came up; 4th, imperfectly.

8. *Sand, Ashes, Ulmate of Ammonia prepared from Sugar, and distilled Water.*—1st, 2d, 3d and 5th, very beautifully developed; 4th, imperfectly.

9. *Sand, Ashes, Humate of Ammonia from Bog Earth, and distilled Water.*—1st, 2d, 3d and 5th, very beautifully developed; 4th, did not come up.

10. *Ordinary Soil and distilled Water.*—Results perfectly identical with those of the preceding experiment.

11. *Ignited Charcoal reduced to a coarse Powder, Ashes, and distilled Water.*—All came up, but were far less developed than in the last three experiments.

If we glance at the results of these experiments, and leave out of question those substances which from some cause or other were injurious to germination (experiments 4 and 5,) it appears,—*a*, that rain-water and atmospheric air do not afford sufficient nutriment to plants; the inorganic substances are wanting; *b*, that rain-water, ashes and atmospheric air do likewise not suffice; *c*, that the aqueous extract of humus contains too little organic substance to yield to the plants what they require; *d*, that ulmic acid prepared from sugar is actually advantageous to the growth of plants, although it contains no nitrogen; *e*, that the humic acid from garden earth is extremely advantageous to the growth of plants; *f*, that the ammonia compound of this latter, as well as the acid from bog earth, produce a luxuriant development; *g*, that lastly, plants do not succeed so well in wood-charcoal and ash, as in ordinary soil, or in the substances mentioned in *e* and *f*.

Lond. Chem. Gaz., from Journ. für Prakt. Chem.

ART. XII.—ON THE JAMAICA DOGWOOD.

Dr. Hamilton, during a visit to the Antilles, was struck by the powerful narcotic effects on fish produce by the bark of the roots of the *Piscidia erythrina*, or *Jamaica dogwood.* Thinking that this might be of utility as a medicine, he found that the tincture, prepared by macerating the bark of the roots gathered during the period of inflorescence, and before the appearance of the leaves (the piscidia being one of the few deciduous trees indigenous within the tropics,) in four times its weight by measure of *rectified* spirit for twenty-four hours, and filtering, was the only eligible mode of preparation. The following was his experiment, and its result.

"Having been for some time a martyr to the toothache, which had deprived me of my natural rest, I determined to make the first trial of my new medicine upon myself; and accordingly on going to bed, mixed a drachm-measure of the tincture with a rummer of cold water, and drank it off—waiting to observe its effects. Soon after receiving it into the stomach, I experienced a violent sensation of heat, which gradually increased in intensity, awakening in my mind a suspicion that the predictions of my friends, who assured me I should poison myself, were on the eve of fulfilment. However, the deed was done, and I resolved to abide the issue without flinching. The sensation of burning gradually extended itself to the surface, and while I was considering what antidote I ought to employ, a profuse diaphoresis burst out from every pore, and a sleep the most profound I ever experienced arrested me so abruptly, that I remained motionless for the whole night, with the uncorked phial in one hand and the glass out of which I had taken the dose in the other, till after the sun was high above the horizon on the following morning, a space of twelve good hours, when I first returned to consciousness, free from every pain or ache, and without any of those unpleasant sensations which invariably succeed to an overdose of opium.

"I had certainly taken a larger dose than was, perhaps, necessary; but the result was most triumphant. I afterwards employed it with equal success, as a topical application, in a number of cases of carious teeth, introducing it on a dossil of cotton into the diseased cavity; and after a single application, I never heard of a return of pain in that tooth. Wishing to compare its powers with those of opium, I took equal measures of water, containing the animalculæ of the mosquito, and having dropped into one glass as much of the tincture of opium as was necessary to make them fall motionless to the bottom, I added an equal number of drops of the dogwood tincture to the other, with a corresponding effect. I then decanted the supernatant liquor, and washed the mass of animalculæ in each glass with fresh filtered water from the dripstone; after a few ablutions, those which had been stupefied by the tincture of opium recovered, and swam about with their wonted vivacity, while all my efforts to revive those acted upon by the dogwood proved ineffectual."

Dr. Hamilton subjoins certain cautions as absolutely necessary to be kept in view. "First, the bark of the roots should be collected about the period of the full moon, in April, at which time the tree is in full flower, or coming into flower, and the leaves have not yet unfolded. Next, that the best rectified spirit alone should be used in making the tincture—the active principle of the bark being only soluble in spirit, and precipitating on the addition of water, with which it makes a milky compound. It is impossible that a longer maceration than I employed might be successful in extracting more completely the active principle; but it might be desirable to divide the tincture so obtained, keeping that made during the first twenty-four hours distinct from the second, or making a portion with twenty-four hours' maceration, and another portion with forty-eight hours' or more; and comparing, by some common test, the relative qualities of each. The following is the formula for the tincture I used:

℞. Pulveris crassi Corticis Radicis Piscidiæ Erythrinæ, ℥j;
Spiritus Vini Rectificati, fl℥iv.

Macera simul per horas viginti et quatuor in vasi aperto et cola. Dosis fl℥j et infra ex haustu aquæ puræ."—*Pharmaceutical Jonrnal.*

ART. XIII.—NEW PREPARATION OF CINCHONA BARK.

M. Donovan, of Dublin, has collected a considerable amount of evidence from numerous medical authors, tending to prove that the alkaloids of the barks, quinine and cinchona, &c., are not the only constituents which give those barks their medicinal properties, but that their anti-periodic efficacy depends, in part, upon other ingredients, and much upon the combination in which the alkaloids are found in the natural state of the bark. The sulphate of quinine is, at present, the form most commonly employed, but many authorities are adduced by Mr. Donovan, to show that it cannot in all cases be depended on.

Under the impression that these preliminary points are proved. Mr. Donovan proceeds to relate his experiments, made with the view to obtain an agreeable preparation, containing all the virtues of the bark in a small bulk. "Hitherto," he says, "there has been no way of exhibiting bark in its full powers, except in the state of powder, which, to most persons, is so disgusting a dose that it is rarely prescribed." The following is the preparation which he conceives accomplishes the purpose :

Let eight ounces of yellow bark, in coarse powder, be digested with a pint of proof-spirit for a week, in a close vessel, with frequent agitation. The tincture is to be fully extracted by the screw press ; the residuum is to be digested with another pint of proof-spirit for a week, and the tincture again expressed. The residuum is now to be boiled for half an hour with a pint of water, and the decoction strongly pressed out. The boiling of the residuum a second and a third time with a new pint of water is to be performed in the same manner; and then the three decoctions, mixed, are to be evaporated by heat to eight ounces. It will be much the better if this be done in a vacuum. The tinctures mixed. are to be distilled or evaporated until eight ounces remain; and these, still boiling hot, are to be added to the evaporated decoction. A pint of liquid will thus be produced, the chief ingredient of which is dikinate of quinina.

To this liquid add 315.31 grains of dinoxalate of quinina, and boil for a few moments; then add 21 troy ounces of refined sugar, and four ounces of best gum arabic, both in powder and previously mixed. The whole is to be kept stirring until the solution is effected; and if the resulting syrup, when cold, does not amount to 32 ounces by measure, water is to be added to make up that amount. When cold, filter through flannel.

In each ounce of this syrup there will be 16 grains of anhydrous dikinate of quinina. This syrup is twenty-five times stronger than the decoction of bark.

It remains to offer a few suggestions relative to the pharmaceutical employment of this syrup. In general it may be used in any mixture of compatible liquids, when the powers of bark are required, and when the other liquids are already sufficiently voluminous, and would be altogether too bulky if decoction of bark were employed. Thus in the simultaneous exhibition of decoctions of bark and sarsaparilla, in equal quantities, the smallest efficient dose of the mixture is six ounces three times a day. By altering the formula to fifteen and a half ounces of decoction of sarsaparilla, and five and a half drachms of syrup of bark, the same powers are exhibited in half the foregoing bulk.

The following contains all its energy in a state of perfect development and activity, and is a pleasant carminative tonic:—

Cinnamon water, six ounces and a half; syrup of bark, half an ounce; compound tincture of bark, an ounce. An ounce measure of this mixture is equivalent to thirty-six grains of bark in substance.

When bark and iron are indicated, the following is the formula in which the least chemical action takes place between the tannin and the iron, as no discoloration appears for several days:—

Precipitated carbonate of iron, syrup of bark, of each an ounce. Mix. Dose, the size of a small nutmeg.

The strength of this syrup is such, that one drachm is a full dose, either by itself or in water. Aromatics, such as anise or fennel, are said perfectly to mask the bitterness of of preparations of quinina. M. Pierquin says, that thirty-two grains of carbonate of magnesia conceal the taste of six grains of sulphate of quinina, without interfering in its virtues.

To conclude: this preparation of bark seems deserving of the attentive consideration of physicians, as it contains all that is valuable in that medicine, in a state of perfect preservation and full energy. It presents the active ingredients exactly in their natural state, which good judges have declared to be in many forms of disease absolutely necessary. It contains nothing but what is an unaltered proximate principle of bark. The form is commodious, not liable to spoiling, is less disagreeable than any other, and may be rendered even agreeable.—*Ibid.*

ART. XIV.—ON THE MODE OF PRESERVING COLCHICUM CORMI.

BY JOSEPH HOULTON, M. D.

In the last July number of your valuable journal, you honored me by a notice of a paper of mine, on the drying of roots, &c., which had been read before the Royal Medico-Botanical Society; I therefore take the liberty to offer some further remarks on the subject—remarks which have been stated to the above-named society, but I am not aware that they have been made public. It always affords me much pleasure to contribute the humble results of my observation and experience towards the advancement of a department of science that has been till lately too much neglected; I am happy to see a spirit rising amongst the pharmaceutical chemists of our country for the improvement of pharmacy. England bids fair to be soon foremost in the field of this department, from the talent and industry that is now engaged in the work. It is curious to contemplate the position that pharmaceutical power is likely to hold in a few years' time, and also its influence, not only on science, but on institutions.

The observations which I beg to place before you are upon the method in which the cormi of colchicum should be managed, so as to insure their drying spontaneously without being sliced. It is simply this: they are to be stripped of their loose dry coats, and the bud or little bulb, the rudiment of the future plant, is to be carefully picked out—it is a very small part, but easily seen; this part has a high vital endowment, and is very tenacious of life, and unless removed the cormi will not readily become dry; yet when that is removed, in any dry place, they will become exsiccated without any trouble, and that in a short time. To show the difference that this circumstance makes, let a few be placed in their entire state near those that have been mutilated, and the difference in a week or two will be very manifest, the entire cormi will appear quite fresh. The plan I adopt is more safe and economical than that usually followed, as the cormi are not exposed to a high temperature, nor are their juices under the direct influence of the atmosphere, both of which circumstances are injurious to the more delicate medicinal vegetable articles.

I have chosen this season of the year to make this communication, because the time is near when the cormi colchici will be ripe: they should be dried before the bud has sprouted. August is a very proper time for preparing them. I hope some, at least, of the pharmaceutical chemists will try the method, if it be but on a small scale. I cannot at present recommend it to be generally adopted, as it is contrary to the explicit orders of the College, and those who have the temerity to break the laws therein laid down, know very well that "*they will not only incur Her Majesty's displeasure, but be proceeded against for such their contempt and offence according to the utmost severity of the law.*"

But practitioners may follow the laws of nature and the dictates of their conscience in reference to pharmacy, without the fear of penal statutes, and I hope there are many who do, and that they will aid in carrying out improvements in Materia Medica, Pharmacy, and Therapeutics.

Ibid.

ART. XV.—AN ACCOUNT OF THE ARTIFICIAL FORMATION OF A VEGETO-ALKALI.

BY GEORGE FOWNES, ESQ.

THE substance which is the subject of investigation in this paper is a volatile oil, obtained by distillation from a mixture of bran, sulphuric acid and water, and is designated by the author by the name of *furfurol.* Its chemical composition is expressed by the formula $C^{15} H^{6} O^{6}$, and its properties are the following:—When free from water and freshly rectified, it is nearly colorless; but after a few hours, it acquires a brownish tint, which eventually deepens almost to blackness. When in contact with water, or when not properly rendered anhydrous, it is less subject to change, and merely assumes a yellow color. Its odour resembles that of a mixture of bitter almond oil and oil of cassia, but has less fragrance. Its specific gravity at 60°, Fahr., is 1.168; it boils at 323°, Fahr., and distils at that temperature without alteration. It dissolves to a large extent in cold water and also in alcohol. Its solution in concentrated sulphuric acid has a magnificent purple color, and is decomposed by water. Nitric acid, with the aid of heat, attacks the oil with prodigious violence, evolving copious red fumes, and generating oxalic acid, which appears to be the only product. It dissolves in a solution of caustic potash, forming a deep brown liquid, from which ashes precipitate a resinous matter. With a slight heat, it explodes when acted upon by metallic potassium.

When placed in contact with 5 or 6 times its bulk of *Liquor ammoniæ,* it is gradually converted into a solid, yellowish-white, and somewhat crystalline mass, which is very bulky, perfectly soluble in cold water, and easily obtained in a state of dryness under a vacuum. The formula expressing the chemical constitution of this substance, or of *furfuroamide*, as the author calls it, is $C^{15} H^{6} N O^{3}$, and it is classed by him with the *amides*. The oil itself appears to be identical with the substance described by Dr. Stenhouse under the name of *artificial oil of ants*. Another substance, isomeric with the amides, and of which the formula is $C^{30} H^{12} N^{2} O^{6}$, was obtained by the author, and termed by him *furfurine*, and found to have the properties of a vegeto-alkali, and to form saline compounds with various acids.

Chemical Gazette.

ART. XVI.—ACETATE OF IRON AS A REMEDY FOR ARSENICAL PREPARATIONS.

The hydrated peroxide of iron is of admitted efficacy in cases of poisoning with uncombined arsenious or arsenic acid; but according to the experiments of Duflos, it is quite ineffectual when these acids are combined with bases, as for example, Fowler's solution, or arsenite of potash, or arseniate of potash, which last is frequently employed in calico-printing, and is consequently easily procured.

In the uncertainty in which the practitioner may be placed as to whether the arsenical poison be free or combined, it is very important to administer the oxide of iron in such a form as to produce a favorable result: to this end it is convenient to employ the peracetate of iron.

This compound may be prepared by adding to the hydrated peroxide of iron obtained from the decomposition of four parts of liquid perchloride of iron, three parts of acetic acid of density 1.06, and sufficient water to make up 16 parts.

This liquid, which is a solution of peracetate of iron with excess of base, precipitates arsenious and arsenic acid from all their solutions, either free, or combined with any base; 500 grains of it are sufficient to decompose 1880 grains of Fowler's solution.

This result demonstrates that liquid peracetate of iron merits preference in cases of poisoning by arsenical compounds. It should be remembered that its power is more rapid in proportion as it is more diluted with water; besides which, large dilution prevents all irritating action of the acetic acid set free. —*Ibid, from Journ. de Ch. Méd.*, Novembre, 1844, as inserted in the *Philosophical Magazine.*

[The mode of preparing the above compound is not very clearly stated, for the strength of the liquid perchloride of iron is not given. It may be presumed that peracetate of iron mixed with peroxide is to be employed; the degree of excess of the latter is of little consequence, and the strength of the peracetate is limited by the employment of four parts of acetic acid of 1.06 made up to 16 parts with water, and this, it appears, is to be largely diluted before exhibition.—Ed. *Phil. Mag.*]

As this is an important antidotal remedy, and as the term "liquid perchloride of iron" may tend to confuse many, perhaps it will be proper to state that the same preparation may be made by taking any quantity of hydrated sesquioxide of iron, prepared according to the U. S. Pharm., dividing it into two parts, then adding to one portion just as much acetic acid, of any strength, as will dissolve it, afterwards adding the other portion of hydrated oxide, and finally, as much water as will make it of the consistence of cream.—Ed. *Amer. Journ. Pharm.*

ART. XVII.—ON THE ADULTERATION OF COCHINEAL.

BY M. LETELLIER, OF ROUEN.

Two varieties of cochineal are found in commerce, the gray and the black. No satisfactory explanation has hitherto been given of this difference. Some think that it is owing to the different methods employed of killing the insect, others attribute it to a different mode of cultivation. MM. Fée, in his 'Cours d'Histoire Naturelle Pharmaceutique,' Bussy, in his 'Traité des Falsifications des Drogues simples,' and Boutron Charlard, in a note inserted in the 'Journal de Pharmacie,' vol. ii. tenth year, are of the same opinion; they think that these kinds of cochineal are only one and the same species, and the differences which are observed in them are owing to the custom of plunging the black cochineal into boiling water in order to kill it, which deprives it of the whitish powder with which it is naturally covered. The gray cochineal, on the contrary, which is killed by being exposed to the heat of an oven, preserves its proper color. M. Guibourt, contrary to these gentlemen, thinks that black cochineal is a variety produced by cultivation, and still further removed from the savage state than the gray cochineal. Black cochineal is, according to this gentleman, richer in coloring matter and held in higher estimation. In confirmation of what he advances, he states that at Bordeaux persons are employed in converting, by a peculiar process, gray cochineal into black, at an expense of fifty centimes (five pence) per pound; he also agrees with M. Bussy, that if at the present time talc or white lead is added to cochineal, it is not black cochineal which undergoes this adulteration, but gray cochineal, with the sole view of increasing its weight. According to M. Fée, gray cochineal is generally more esteemed than black, because this latter has lost a little of its coloring principle by its immersion in boiling water at the time of gathering. He is not of the opinion of Boutron Charlard, who thinks that both are equal in quality. The latter person says, contrary to Guibourt, that black cochineal is transformed into gray, because this last is of more value.

The result of all these contrary opinions is, that it is perfectly impossible to judge of the goodness of a cochineal by its physical characters. In order to ascertain its value, we must have recourse to comparative experiments. We are indebted to MM. Robiquet and Anthon for two methods of determining the quality of cochineals according to the quantity of carmine they contain. The process of M. Robiquet consists in decolorizing equal volumes of decoction of different cochineals by chlorine. Using a graduated tube, the quality of the cochineal is judged of by the quantity of chlorine employed for decolorizing the decoction. The process of M. Anthon is founded on the property which the hydrate of alumina possesses, of precipitating the carmine from the decoction so as to decolorize it entirely. The first process, which is very good in the hands of a skilful chemist, does not appear to me to be a convenient method for the consumer; in the first place, it is difficult to procure perfectly identical solutions; in the next place, it is impossible to keep them a long time without alteration. We know that chlorine dissolved in water reacts, even in diffused light, on this liquid, decomposes it, appropriates its elements, and gives rise to some compounds which possess an action quite different from that of the chlorine solution in its primitive state. The second process seems to me to be preferable, as the proof liquor may be kept a long while without alteration. A graduated tube is also used; each division represents one hundreth of the coloring matter. Thus, the quantity of proof liquor added exactly represents the quantity in hundredths of coloring matter contained in the decoction of cochineal which has been submitted to examination.

In my investigation I have not had recourse to chemical agents as did MM. Robiquet and Anthon; I had no hope of finding a better and more simple process than those proposed by them. I employ nearly the same course for cochineal as that followed by M. Girardin for annotto. In a word, it is by colorimetric essays that I judge of the quality of the cochineals of commerce. This method appears to me so simple and so convenient, that I think it right to make it known. It enables the consumer to judge of the value of a cochineal as well as the chemist.

As I have before said, two kinds of cochineal are found in commerce, gray and black. The gray cochineal may be separated into two very distinct varieties. The first is large, heavy, regular; the eleven rings which form it are distinctly seen. The insect has pretty nearly preserved its form, convex on one side, and concave on the other; its gray color is owing to the whitish powder with which it is covered during its growth. The second variety is irregular and quite without form. The whitish coating which covers it is heaped in such great quantities in the concave part and between the rings of the insect, that it is in the form of small round masses, in which it is hard to distinguish any traces of the rings so well characterized in the first variety. This cochineal is in general the heaviest: it almost always contains, independent of the talc in which it has been rolled, some sand or metallic dust, which singularly increases its weight.

Black cochineal does not offer very distinct characteristics; it is sometimes like the gray cochineal, No. 1, heavy, concave on one side, convex on the other; at other times it is quite irregular, small and wrinkled in every direction; it is almost impossible to distinguish its first form and some traces of the rings which compose it. These latter characters belong especially to zacatillée cochineal.

Exhausted Black Cochineal.—Until 1840 the calico-printers, after having treated the cochineal at different intervals with water, threw it away as completely exhausted. M. Lembine, a dyer of Rouen, was, I believe, the first whom the idea struck of ascertaining if this cochineal, which the cotton-printers threw away, was entirely deprived of its coloring principle. He found that it still contained from about 15 to 18 per cent. The dyer now buys this residue from the cotton-printer, at the price of from 1*s.* 6*d.* to 2*s.* 6*d.* the 2 lbs.; he dries it, spreads it in thin layers in a well-aired place, and preserves it in barrels for use. This cochineal having begun to undergo decomposition during its desiccation, always has a smell of putrified animal matter; it is black, quite without form, often agglomerated into more or less large masses.

Down of Cochineal.—We sometimes find a gray light substance in commerce, mixed with a great quantity of small black granules hard to the touch; this substance is known by the name of down, or cochineal siftings. MM. Fée, Boutron Charlard, Bussy and Guibourt, who have written on this insect, do not speak of this product. It contains about 20 per cent. of coloring matter.

These two products have lost much of the preference which dyers used to give them on account of the low price at which they were to be bought; because in order to obtain as beautiful a tint and as dark a one with them as that obtained with pure cochineal, three or four times as much matter is necessary, to which must always be added a small quantity of unexhausted cochineal; secondly, because this matter fills up the vats, and is very hard to detach from the tissue.

I owe to the kindness of the merchants of this town thirty specimens of cochineal, on which I have made experiments. In the houses which carry on a wholesale trade in this commodity, I have constantly found the same kinds of cochineal: the pure gray cochineal, No. 1, or gray cochineal of the Canaries, the blackish gray or zacatillée cochineal, No. 2, and the black or zacatillée cochineal, No. 3. This last is adulterated; merchants buy it as such. According to the information I gathered from these gentlemen, a great part of the cochineals which come to Bordeaux are converted into zacatillée cochineal. There are persons in this town whose sole occupation this is. This cochineal is offered to the merchants at from 6, 8 and 10 per cent. below the current price. Guibourt, as I before said, mentions this fraud as a certain proof that the black cochineal is superior to the gray.

By examining the zacatillée cochineals of commerce attentively, knowing moreover that they are always sold below the current price, I thought that only two kinds of adulteration were possible; the first might consist in rolling the cochineal, rendered moist, in a black heavy powder (manganese for example,) to change the color and increase the weight; the second, to deprive it of the whitish layer which covers it, by soaking it in boiling water, which at the same time must take a part of its coloring matter from it, which would be made use of. The first method hardly seems probable; a part of the black dust becoming detached by rubbing would always betray the adulteration. The irregular form of this cochineal, and the roseate lustre which it presents, lead me to think that the second kind of supposed adulteration is the most likely. I am therefore of opinion, according to my experiments, that gray cochineal is treated with warm water to extract a part of its coloring principle, that by this immersion the insect is in great part deprived of the white powder which covers it, and is transformed into black zacatillée cochineal. Whether it is this or any other method which is put in practice, it is certain that the zacatillée cochineal is less rich in coloring principle. It is sold as such in commerce; but it often happens that zacatillée is advertised at 6 per cent., and that it is 10, 12, and sometimes more. Up to the present time the buyer has not possessed an easy method of appreciating the different degrees of adulteration.

In the specimens which I procured from persons who retail cochineal, I found exactly the three qualities before mentioned, in addition the gray cochineal No. 2, which is frequently met with, and a cochineal which is quite black and contains a little sand. It is almost always in these last two that I found matters introduced to increase the weight.

When examined with a glass, the metallic powder that I obtained from four specimens only of cochineal out of twenty-three, presented all the physical characters of lead filings. Treated with nitric acid, it yielded a solution, which, when tested with chemical agents, showed all the characters peculiar to the salts of this metal.

The result from what precedes is, that the adulteration mentioned by M. Boutigny is but little spread in the wholesale trade; that this sophistication is, as I suspected, made in France and with the exhausted cochineals.

Colorimetric Tests.—I shall not describe the colorimeter, but shall refer for that to the memoir of M. Houton Labillardière, in the 'Bulletins de l'Académie Royale,' 1827, p. 73. The memoir of M. Girardin, inserted in the 'Bulletin de la Sociètè Libre d'Emulation,' 1836, p. 149, may be consulted.

The coloring matter of cochineal being soluble in water I have used this solvent for exhausting the different kinds which I have submitted to examination in the colorimeter. I operated in the following manner:—I took a grain of each of the cochineals to be tried, dried at 122° F.; I submitted them five consecutive times to the action of 200 grains of distilled water at water-bath heat, each time for an hour; for every 200 grains of distilled water I added two drops of a concentrated solution of acid sulphate of alumina and of potash. This addition is necessary to obtain the decoctions of the different cochineals exactly of the same tint in order to be able to compare the intensity of the tints in the colorimeter.*

---

* Care must be taken not to add to the water, which serves to extract the coloring matter from the different cochineals, more than the requisite quantity of acid sulphate of alumina and solution of potash, because a stronger dose would precipitate a part of the coloring matter in the state of lake.

The purchaser now examines his cochineal by dyeing a sample of wool. The result obtained is compared with that of a cochineal whose tinctorial value is known to him; he operates at water bath heat for two hours. Having begun this investigation in the hope of giving an easier and quicker process than those which have been used up to the present time, I have endeavored to extract the coloring matter of the cochineal by a single treatment. I obtained this result: that five decigrammes of cochineal, treated at water-bath heat for an hour, with 1000 grs. of spring water, and the addition of ten drops of a solution of alum, were almost entirely exhausted. The liquor when cold was perfectly transparent, and gave in the colorimeter the same results which I obtained by the first process. The apparatus which I used is composed of two flasks of about a quart capacity, suspended by their necks to a small plank, the two extremities of which rest on the edge of a cylindrical vase which serves as a water-bath for them. Before applying heat, the weight of each flask containing the cochineal and the alum water in the indicated proportions should be separately taken. After an hour's boiling it is left to cool, each flask is again separately weighed, and to each of them is added the quantity of distilled water necessary to establish the primitive weight.

Some time ago M. Boutigny sent me four specimens of cochineal which he had received from M. Pimont of Bolbeck:—1, a cochineal from the Canaries; 2, a blackish-gray or zacatillée cochineal; 3, a black or zacatillée cochineal; 4, and lastly, a small blackish-gray cochineal, known by the name of rosette cochineal. Till then I had employed as basis for my experiments cochineal from the Canaries obtained from a merchant in this town.

The rosette cochineal gave me more coloring matter. The tinctorial value is to that of the gray cochineal as 105 or 110 are to 100.

In order to estimate a cochineal in the colorimeter, two solutions obtained, as described above, are taken; some of these solutions are introduced into the colorimetric tubes as far as zero of the scale, which is equivalent to 100 parts of the superior scale; these tubes are placed in the box, and the tint of the liquids enclosed is compared by looking at the two tubes through the eye-hole, the box being placed so that the light falls exactly on the extremity where the tubes are. If a difference of tint is observed between the two liquors, water is added to the darkest (which is always that of the cochineal taken as type) until the tubes appear of the same tint.* The number of parts of liquor which are contained in the tube to which water has been added is then read off; this number, compared with the volume of the liquor contained in the other tube, a volume which has not been changed, and is equal to 100, indicates the relation between the coloring power and the relative quality of the two cochineals. And if, for example, 60 parts of water must be added to the liquor of the good cochineal to bring it to the same tint as the other, the relation of volume of the liquids contained in the tubes will be in this case as 160 is to 100, and the relative quality of the cochineals will be represented by the same relation, since the quality of the samples tried is in proportion to their coloring power.

Conclusion.

1. The adulteration of cochineal by a metallic substance mentioned by M. Boutigny, is not of frequent occurrence in the trade, but it exists.

2. The value of the different cochineals tried may be separated into very distinct classes. The rosette cochineal and the gray cochineal, which I have always taken for comparison, appear to me to be the richest met with in the

---

* For diluting the liquors the same water must always be used which has served to extract the coloring matter of the cochineals under examination, otherwise the darkest decoction would pass into violet as water was added to it to bring back the tint to the same degree of intensity as that of the decoction to which it is compared.

trade. In the second rank I will place the other gray cochineals, No. 1, which I have tried, and the zacatillée cochineals. Last come the gray cochineals, No. 2, and the zacatillée cochineals, which I think adulterated and in great measure exhausted.

3. A single treatment pretty well exhausts a sample of cochineal so as to give a just notion of its tinctorial value and of its trade price.

4. I am induced to think that the richness of the cochineals depends greatly on the mode of cultivation of this insect and on the district whence it is derived.

Chem. Gaz., from Journ. de Pharm. et de Chim.

ART. XIX.—OBSERVATIONS ON ASPARAGINE.

BY M. PIRIA.

Towards the end of last winter, Dr. Menici of Pisa sent me a crystallized matter, which he had just extracted from the climbing vetch, with the request that I would examine and determine the nature of it by analysis. This sample did not seem to be sufficiently pure to be submitted to analysis; and the quantity being too small to allow of purification, I undertook to prepare the substance myself, that I might be able to submit to a careful investigation.

I sowed about 10 lbs. of seed in a closed chamber, the floor of which was covered with vegetable mould. The germination took place, the light being excluded, and the plants soon grew to a considerable height. I then gathered them, expressed the juice, and submitted it to evaporation; first of all I observed the coagulation of a great quantity of albumen; the liquid somewhat evaporated, and left to itself, deposited a mass of crystals of the substance in question. The evaporated mother-liquors afforded a fresh crop of crystals. The substance was brown, and weighed about 340 grms. Purified by repeated crystallizations and by means of animal charcoal, it gave definitely 150 grms. of a perfectly crystallized white matter, in the form of prismatic crystals, similar to those of sugar candy.

The characters of this body, and especially the facility with which it disengaged ammonia under the influence of alkalies, led me to suspect its identity with asparagine, which was confirmed by analysis. I obtained—

Carbon - - -	31.80
Hydrogen - -	6.85
Nitrogen - - -	42.54
Oxygen - - -	18.80

The purity of the product thus obtained, its abundance, and the simple means of extracting it, lead me to think that the method of preparation just described will hereafter be adopted by chemists as preferable to every other. Independent of the discovery of this new source of asparagine, there are some important questions of chemical physiology connected with the experiment which I have described. We may ask,—1st, if the absence of light is indispensable to the production of asparagine; second if the asparagine pre-exists in the seed, or whether it is produced during the act of germination; 3d, what part asparagine performs in the economy of the plant.

It was in the hope of throwing some light on these questions that I undertook the investigations, the principal results of which are the subject of this notice. I treated some seed and some plants arising from the germination of these under the influence of light, by a process analogous to that which has been described. The seed did not supply the least trace of asparagine; the plants, on the contrary, give it in abundance. Lastly, I submitted some plants, gathered at the period of flowering and fructification, to the same treatment; but the liquor, even highly concentrated, did not furnish crystals; however at a certain period of the evaporations an abundant deposition of a salt of lime was formed, the acid of which seemed to me to be new. We may then conclude that the seed of the vetch does not contain asparagine, and that this matter is developed in the act of germination, either in the light or in the dark, to disappear again when the plant flowers.

The production of asparagine in the dark proves that this matter does not derive its elements from the atmosphere, as is the case with so many other products which originate in vegetables under the influence of light. It is probable that a nitrogenous substance (perhaps casein) exists in the seeds in question, which is transformed into asparagine, and into other products, during germination.

Led by these views, I undertook comparative researches on the composition of the seeds, and the plants which originate from them, at the different periods of their development. I will make known the results of my experiments as soon as they are terminated; for the present, I publish the principal facts observed, in order to ensure priority.

When asparagine is not perfectly pure, it soon changes directly even in its aqueous solution; after a few days a kind of fermentation takes place in the liquor, which totally decomposes the asparagine. The surface of the liquid is covered with mould, and the liquor exhales the insupportable odour of decomposing purulent matters. The same change is manifest when a certain quantity of juice extracted from the plant is added to a solution of pure asparagine. In every case, at the end of a few days, the solution of the asparagine has disappeared, and in its place we find *succinate of ammonia.*

The last fact seemed to me important enough to be confirmed by analysis. I prepared a fresh quantity of succinate of ammonia by the same process and on a greater scale; I then transformed it into succinate of lead; this, decomposed by sulphuretted hydrogen, afforded a liquor from which I extracted pure crystallized succinic acid. The analysis gave—

	Found.		Calculated.
	I.	II.	
Carbon - - -	40.27	40.4	40.67
Hydrogen - -	5.28	5.1	5.08
Oxygen - -	54.45	54.5	54.25

To explain the tranformation of the asparagine into succinate of ammonia, we may suppose the pre-existence of succinic acid in the asparagine and its production by a disintegration induced by the fermentation. But this view of the subject seems improbable to me. I rather think that the crystallized asparagine, the formula of which only differs from that of succinate of ammonia by 2 equiv. of hydrogen, takes this hydrogen from the putrefying matters by virtue of an action analogous to the tranformation of blue indigo into white indigo, under the reducing influence of the organic matters undergoing putrefaction.

I hope however to resolve this questiou by direct experiment.—*Ibid, from Comptes Rendus*

ART. XVIII.—VALERIANATE OF QUININE—ITS THERAPEUTIC EMPLOYMENT—MODE OF PREPARATION AND ADMINISTRATION.

(Translated from the French—*L'Abeille Medicale.*)

Dr. Francis Devay, Physician to the Hotel Dieu de Lyon, through an essay published in the *Gazette Medicale,* directs the attention of practitioners to a new combination of valerianic acid with a vegetable alkali—quinine. We are induced to augur favorably of this union of the active principle of valerian to the medicinal agent of the most powerful of our exotic products. According to Mr. Devay, this provision is fully justified by clinical verification: valerianate of quinine in small doses is anti-periodic, very effectual, and superior to the sulphate by its nevro-sthenic properties.

Doubtless the gastro-intestinal accidents produced by this latter salt have been much exaggerated; still, it is no less true that the sulphate is much more irritating than the bark in substance; first, by reason of its greater solubility; and again, because it has not the corrective properties possessed by the Peruvian bark, viz.—tannin.

It is not so with the valerianate. In this last product the quinine is modified by its intimate association with a vegetable acid, which, to a slightly perturbating action upon the nervous system, joins those eminently characteristic of Peruvian bark. There is, in this, a fact connected with therapeutic dynamics, concerning which we cannot too much engage physicians to consider attentively. Thus, as we said before, in our first memoir, valerianate of zinc is an antispasmodic raised to its highest power; so valerianate of quinine is a medicine endowed with *antiperiodic* powers of the greatest energy. This is a fact we have acquired through numerous cases zealously collected several months since. But it is due to us to say, that the administration of the valerianate will for a long time expose the practitioner to mistakes, until the apothecaries generally become experienced in its composition, and in all the minute and delicate preparations required by it. Mr. Devay remarks, that to judge of the therapeutic action of valerianate of quinine, it is necessary, first of all, to satisfy ourselves of the excellence of its composition. His experiments were made with valerianate of quinine, prepared under his supervision by Mr. Guillermond, a skilful pharmaceutist of Lyons.

Characters.

According to the analyses of the Prince of Canino, who was the first to prepare and describe valerianate of quinine, this salt is formed of one equivalent of valerianic acid, one of quinine, and two equivalents of water, of which one constitutes its water of crystallization. The crystalline form of this salt is very different; it is octœdrical or hexædral. We have ourselves obtained it in hexædrons, flattened on two faces, and forming rhomboidal tables perfectly characterized. It is often agglomerated in light, silky masses. Independent of this last fact, the crystals are hard and tolerably heavy.

Valerianate of quinine has a slight odour of valerianic acid, and a decided bitter taste, recalling that of cinchona. It dissolves with facility in water at a common temperature. Alcohol is a better solvent; and olive oil dissolves it equally well, assisted by a slight heat. The mineral acids, and most of the organic acids, decompose it. Submitted to a heat of about 90°, crystallized valerianate of quinine loses an equivalent of water, softens, and melts like a resinous substance. Deprived of water, it is rendered insoluble in this liquid, while, on the contrary, it is very soluble in alcohol. Exposed to a higher temperature, it cannot be made to part with its other equivalent of water, but is decomposed, and mono-hydrated valerianic acid vapors are seen to escape from the resinous mass. The aqueous solutions of this salt, exposed to the heat of boiling water, also decompose, and oily drops are seen to float upon the surface of the liquid, which cannot be made to redissolve in the water, except by means of spirit of wine, and is nothing more than mono-hydrated valerianate.

Preparation.

To a concentrated alcoholic solution of quinine add valerianic acid in slight excess. Dilute the alcoholic solution with twice its volume of distilled water; mix intimately, and evaporate in a stove at a heat not surpassing 122°, Fahr. After the evaporation of the alcohol, the valerianate is exhibited in the form of handsome crystals, here and there grouped or isolated, which increase from day to day.

The valerianate of quinine may likewise be prepared by double decomposition, in mixing sulphate of quinine with valerianate of lime or baryta, both being dissolved in weak alcohol. We have ourselves obtained this salt in mixing an alcoholic solution of the neutral sulphate of quinine with an alcoholic solution of valerianate of potash.

The process succeeds, after several successive trials, to insure the perfect decomposition of the two salts. These methods are only good in saving time; it is far better to act in a direct manner, so as to have finer and purer products.

Whatever mode of preparation be adopted, it should always be borne in mind that the solution must be evaporated slowly, with a gentle heat, and the crystals not to be separated from the mother waters except to dry them in the open air.

Valerianate of quinine may be distinguished as follows:—

1st. A concentrated alcoholic solution of valerianate of quinine precipitates the concentrated neutral aqueous solution of nitrate of silver: this precipitate is redissolved in a large quantity of water.

2d. An aqueous solution of valerianate of quinine does not precipitate one of chloride of barium.

3d. This aqueous solution, submitted to ebullition, allows some oleaginous drops of melted hydrated valerianate to separate.

4th. If this solution be treated with acids, valerianic acid is disengaged, which may easily be recognized by its odour; and if this decomposition be effected with crystallized valerianate of quinine and a concentrated liquid acid, valerianic acid will be obtained in an oleaginous form.

Mode of Administration.

Like the valerianate of zinc, this of quinine being very delicate, or more correctly speaking, easily decomposed, it is best to administer it in the most simple form: in this belongs a necessary condition to its successful use.

We mostly give it in a gummous solution. Five decigrammes of the salt, (8 grs.) according to our experiments with Mr. Guillermond, dissolve easily in 100 grammes of gummous vehicle. One of the great advantages of valerianate of quinine is to be able to dissolve it easily in oil, and use it in this manner for frictions and embrocations upon the region of the spleen. With this object we have made use of the following liniment:

℞	Olive oil,	60 grammes.
	Valerianate of quinine,	1 gramme.

For neuralgia we use commonly pills containing 6 centigrammes each, prescribed in the simplest manner.

To appreciate the therapeutic value of valerianate of quinine, Mr. Devay reports, out of many cases under his observation, 14, for the most part severe and complicated intermittent fevers, which were cured by the administration of valerianate of quinine, when the sulphate even proved abortive. Each dose was from 10 to 40 centigrammes (1½ to 6 grs.) a day, according to circumstances. The author cites no instances of failure, and mentions no inconvenience resulting from the employment of this new therapeutic agent.

He concludes thus:

1st. Valerianate of quinine is a superior antiperiodic to the sulphate by its nevro-sthenic properties, and because it acts in smaller doses.

2d. Its pure and simple administration is of equal value with that of cinchona and the *névritiques* combined.

3d. In fevers of the worst character (ataxiques-malignes) it is sought to render the most eminent services by its specific properties.

A. D.

MINUTES OF THE COLLEGE OF PHARMACY.

At a Stated Meeting of the Philadelphia College of Pharmacy, held 3d mo. 31st, 1845,

By a report from the Committee of Examination and Professors, the College was informed that the following gentlemen had passed a satisfactory examination, and complied with the requisitions of the College. They are therefore declared Graduates of the Institution:

William W. Webb,	Thesis on	Rubus Villosus.
William N. Needles,	"	Cornus Florida.
Caleb H. Keeney,	"	Rubus Villosus.
Joseph Allen McMakin,	"	Marrubium Vulgare.
Thomas Leidy,	"	Scuttelaria Integrifolia and Scuttelaria Hyssopifolia.

The edition of Latin Labels being nearly exhausted, a Committee of three members were appointed, with authority to publish a new edition, and use the name of the College.

The Publication Committee made a favorable report of the Journal under their care, and informed that a balance remained in their hands.

The College proceeded to the Annual Election. Ambrose Smith and Samuel F. Troth were appointed Tellers, who reported that the following gentlemen had received a majority of votes. Whereupon they were declared by the Chairman, duly elected officers of the College.

President,

Daniel. B. Smith.

1st Vice President,

Charles Ellis.

2d Vice President,

Samuel F. Troth.

Treasurer,

Joseph C. Turnpenny.

Secretary,

Dillwyn Parrish.

Corresponding Secretary,

William Hodgson, Jr.

Trustees,

Dr. Joseph Carson,
William Procter, Jr.,
Edward Parrish,
Albert S. Letchworth,
John H. Ecky,
Warder Morris,
Richard W. Test,
William P. Troth.

Publishing Committee,

Charles Ellis,
A. J. Duhamel,
Dr. Joseph Carson,
William Procter, Jr.
Ambrose Smith,
Dr. Robert Bridges,
Thomas P. James.

Extracted from the Minutes.

Dillwyn Parrish, Secretary.

MISCELLANY.

Variations of the Boiling Point of Water, according to the nature of the Vessels.—M. F. Marcet has made a series of careful experiments upon the variability of the boiling point of water, according to the different nature of the vessels in which the ebullition took place. The following are the results of his researches on this point:—1, the boiling point of water in glass vessels is at 100°.3 and 102° (cent.) according to different circumstances, and especially according to the variety of the glass. In these cases, the temperature of the vapour of the water is constantly the same, and some hundredths of a degree lower than when the water boils in metallic vessels. 2. Whatever may be the nature of the vessel in which the ebullition is performed, the temperature of the aqueous vapour is always inferior to that of the water which gives rise to it. The mean of this difference, in glass vessels, is about 1°.06, while in metallic vessels, it is but as 0°.15 to 0°.20. There is but one exception to this rule, and that is where the interior of the vessel in which boiling is accomplished, whether it be of glass or of metal, is covered with a thin coating of sulphur, or gum-lac, or any other substance which exercises a repulsive action on the water; the boiling water and the vapour are then of the same temperature. 3. Contrary to the opinion generally admitted, the boiling point under a high pressure is not lowest in metallic vessels, but in glass vessels, when the latter are lined interiorly with a layer of the above-mentioned substances. 4. In glass vessels, the internal surface of which is perfectly smooth, and devoid of all foreign matter, we may carry the temperature of water or of alcohol to several degrees above the boiling point, before ebullition is induced; we may thus bring the temperature of water up to 105° before ebullition takes place. If the experiment does not succeed, it is owing to the presence of foreign matters adhering to the internal surface of the glass. We may insure success by making choice of a new globe, and heating therein sulphuric acid, until it reaches × 150°, subsequently washing it out with perfectly pure water.—*London Med. Times.*

New Method of preparing Oxygen.—M. Balmain prepares oxygen by heating in a retort a mixture of three parts of bichromate of potash with four parts of concentrated sulphuric acid. This mixture furnishes, at a gentle heat, a great abundance of pure oxygen gas, which amounts to but a third of the expense of the same quantity of oxygen prepared by means of the chlorate of potash. One atom of KCr^2 produces three atoms of free oxygen, and leaves a residue composed of $KS + Cr S^3$, with which a new quantity of bichromate may be readily prepared.—*Ibid.*

Bichloride of Hydrogen.—M. Millon states to have found a combination of hydrogen and of chlorine which contains double the quantity of chlorine that exists in hydrochloric acid. If, to hydrochloric acid, artificially cooled by means of a mixture of ice and salt, we add a small quantity of peroxide of lead, a precipitate of chloride of lead is thrown down, without any disengagement of chlorine; but we obtain a deep yellow liquid, which disengages chlorine during several days on exposure to the ordinary temperature of the air. To prove that this combination is formed of $H\ Cl^2$, he quotes that mercury, by its reaction upon it, produces chloride of mercury and hydrochloric acid. Zinc, added in small pieces, dissolves also without any disengagement of gas. These proofs are not very conclusive, for the same thing would take place with cold liquid hydrochloric acid in which chlorine gas had been condensed. But, on the other hand, as there exist corresponding combinations with brome and iodine, it is very probable that there also exists one with chlorine, and that it may be produced in this manner. The most easy way of preparing it would be to pass a stream of chlorine through very cold concentrated hydrochloric acid, or else to add liquid chlorine till saturation; or, again, one might endeavour to reduce, below the temperature of 0 deg. cent., a mixture of two volumes of hydrochloric acid and one volume of chlorine, and see if any condensation takes place.—*Ibid.*

Cement for Stone Ware, Earthen Ware, &c.—Is best obtained by melting together 3 parts sulphur, 2 parts white resin, 1 half part shell-lac, 1 part elemi, and 1 part mastic, with 3 parts brickdust. This cement is spread on the previously warmed surfaces.— *Chem. Gaz.*

On the Composition of the Protocarbonate of Iron. By M. WITTSTEIN.—The carbonate of the protoxide of iron, precipitated by powdered crystalized carbonate of soda from a boiling solution of recently-prepared protosulphate of iron, washed by decantation, well-pressed in linen and dried, contains, according to Wittstein, protoxide of iron, water and carbonic acid, in the proportion of 46.7 : 13.6 : 28.7, which corresponds to the formula $FeO\ CO^2, HO$. Moreover, a variable quantity of hydrated peroxide of iron is always mixed with it. The salt becomes heated in the air, disengages carbonic acid, and passes into hydrated peroxide, losing nearly 23 per cent. in weight. The residuous reddish-brown powder, which is free from carbonic acid, yields on ignition 22 per cent. water, which would correspond to the formula $3Fe^2O^3+8HO$. On ignition the protocarbonate of iron leaves 59.48–60 per cent. anhydrous peroxide of iron.—*Ibid, from Buchn. Repert.*

On the Preparation of pure Caustic Potash and Soda. By M. Bizio.—The best method of rendering potash and soda caustic is, according to the author, to mix a solution of 1 part of the dry carbonate salt with 1 part freshly-prepared dry hydrate of lime, and allowing it to stand in a closed vessel for 24 hours at a temperature of 68° to 78° Fahr., frequently shaking it. The potash should be dissolved in 12 to 15, the soda salt in 7 to 15 parts water; the carbonate of lime separates in a granular state, and the clear caustic ley may be decanted. A weaker ley may be obtained from the residue by fresh treatment with water.—*Ibid from Berzelius, Jahresbericht.*

Preparation of Pyrophorus from Alum. By M. Elsner.—An intimate mixture of 3 parts roasted alum and 1 of flour is conveyed into a phial, which is placed in a Hessian crucible filled up to the neck with sand; the crucible is then heated in a wind-furnace till the glass nearly melts. The phial is then stopped up and allowed to cool. A pyrophorus made from 5 parts alum and 1 part powdered charcoal, is also very good, and never fails if a sufficient heat has been employed in its preparation.—*Ibid, from Journ. für Prakt. Chem.*

On the Detection of Prussic Acid in Cases of Poisoning. By M. Witting.—The method recommended by the author in suspected cases of poisoning by prussic acid, is to mix the mass with one-sixth alcohol, and to distil off one-fourth. If it contain prussic acid, the distilled product generally evolves the peculiar smell. To this product a little caustic potash is added, and then a mixed acid solution of protochloride and perchloride of iron, when prussian blue is formed.

If it be suspected that the poisoning was effected with cyanide of potassium, cyanide of zinc, &c., some hydrochloric acid should be added along with the alcohol previous to distillation.—*Ibid, Berzelius's Jahresbericht.*

Employment of Castor oil seeds as a purgative. By Dr. Mialhe.—Castor oil according to M. Soubeiran is less purgative than the seeds which have furnished it. This is because the oil which flows from the press carries with it comparatively little of the resin which remains in the marc.

M. Mialhe reports various therapeutic results obtained by the aid of an emulsion prepared with the fresh seeds of the Ricinus communis, which go altogether to support this opinion; because with two drams and a half (10 grammes) of the seeds deprived of their envelope an emetico-cathartic effect was produced which continued during three days, without opiates, cool effervescing draught, or cataplasms being able to subdue it. An emulsion prepared with seventy-five grains (5 grammes) caused twenty-eight vomitings and eighteen alvine evacuations.

Finally with a third emulsion containing only (1 gramme) 15½ grains of the seeds, the emetico-cathartic effect was yet very marked.

M. Mialhe concludes from these facts:

1st. That the oleo-resinous principle found by M. Soubeiran in the seeds of the Ricinus exists but in very minute proportion in the oil of these seeds, whilst it is found wholly in the emulsion;

2d. That the castor oil seeds of France contain a large proportion of the emetico-cathartic principle proper to a great number of the plants of the family Euphorbiaceæ;

3d. That an emulsion of the seeds of the castor oil plant prepared with only 20, 30, or 50, centigrammes (about 8 grains) of the seeds, constitutes perhaps the most agreeable purgative to the taste, of all those now in use, if the emetic action of this emulsion ceases when the dose of the seeds is properly diminished. Although this last peculiarity has not yet been proven by clinical observation it is probable that it is real, because the active principle of the Ricinus communis is analogous if not nearly identical with that of the croton oil. Now it is said that this last oil, which is simply purgative in doses of one drop, becomes emetico-cathartic by increasing this small dose.—*L'abeille Med. from Bull. de Ther.*

Purification of Naphtha.—Dissolve 15 drams of chromate of potassa in 30 drams of water, place the solution in a large bottle containing two pounds of colored naphtha. Agitate the mixture several times, every day for a month and keep it in a light place. At the end of this time the naphtha is no longer red, and the resinous and soft portion is deposited at the bottom with the solution of chromate of potassa. By decanting with a syphon the naphtha is obtained perfectly white, without odour, and deprived of its impurities.—*L'abeille Med. from Echo du Monde Savant.*

Purification of Linseed Oil.—Take two pounds of protosulphate of iron, dissolve it in six pints of rain water, and throw the solution in a large bottle already containing the linseed oil. The mixture is put in a light place, and agitated once or twice a day, during 4 or 6 weeks. After this time the linseed oil is perfectly purified and white; all its mucilage and vegetable albumen is precipitated in the solution of sulphate of iron. It is then carefully decanted from above the solution and deposite, and a perfectly white and well purified linseed oil is obtained, and which moreover dries very easily. The sulphate of iron employed in this operation will serve again if the solution is filtered and evaporated to crystallization.—*Ibid.*

Dentifrice of M. Mialhe.

Take of

Sugar of milk or Lactine		400	grammes
Pure tannin		6	"
Carmine lake		4	"
Ess. of mint (English)			
Ess. of anise	of each	8	drops
Ess. of orange flowers		4	"

Grind the Tannin and Lake with a small quantity of lactine carefully in a flat bottomed porcelain mortar, and add afterwards the remainder of the sugar of milk and the essences, and triturate until the mixture be perfectly homogeneous. The sugar of milk, although soluble, is sufficiently *resisting* to act mechanically on the enamel of the teeth without altering it, and the tannin is useful from its astringency in keeping the "gums" in a proper state of tonicity.

Reagents to distinguish between Cherry Laurel Water and that of Bitter Almonds.—According to M. Weber, ammonia will establish a marked difference between these two distilled waters, when treated in the following manner: Take two test-glasses, and pour into them separately a few drops of these two waters, then add to each a drop of liquid ammonia. Agitate, and then allow it to remain quiet; the cherry laurel water acquires a milky color, while that of bitter almonds undergoes not the slightest change.

Dr. Aschoff has observed that thirty drops of cherry laurel water, form with five of sulphate of quinia, a solid mass, while the same phenomenon is not produced with the concentrated water of bitter almonds. The volatile oils of the same products present analogous differences when submitted to the same proof.—*Journ. de Chim. Med.*

Note upon Cantharides. By M. Batka.—We owe to Dr. Metrenheimer, of Giessen, the fact, that the Lytta Syriaca is mixed with the cantharides of commerce. I confine myself to stating this fact, observing, nevertheless, that I have never found this insect in the cantharides of Hungary, as states Dr. M., but very often in that of Moldavia. Once such admixture, which I had not observed, was the cause of considerable loss to me, the purchaser refusing the cantharides, because not genuine and of inferior quality. In fact, the Lytta Syriaca is one-third smaller than the Lytta Vesicatoria, and its red tarsus is less vesicating, as has been proved by experiment. Although this admixture has been rarely observed since in commerce, it has appeared to me that it would be proper to point it out.—*Journ. de Pharm.*

Aqueous infusion of Galls as a test.—This is best prepared according to M. Pettenkofer by infusing one part of pounded galls in three or four parts of water, allowing it to stand for several hours, straining, submitting the residue to pressure, adding to the turbid liquid two parts of common salt, and separating by filtration the glutinous precipitate which is produced. This liquid retains its transparency and power of precipitating gelatin for years—*Buchn. Repert. and Chem. Gaz.*

Preparation of Mercurial Ointment.—M. Heusler recommends the following method:—6 oz. of Mercury, 2 oz. of Suet, and 6 oz. of Lard, are rubbed together in a shallow iron mortar with the addition of about a drachm of sulphuric ether at intervals, until all the globules have disappeared.

The process occupies about three quarters of an hour, and the quantity of ether required is about 7 drachms.—*Jahrb. für Prakt. Pharm. and Chem. Gaz.*

Aqua Sinapis.—According to M. Heusler by the distillation of 18 oz. of coarsely powdered black mustard, with 8 oz. of alcohol and sufficient water, until 36 ounces have passed over, a liquid is obtained, which, when applied to the skin or linen moistened with it, acts more quickly and powerfully than an ordinary mustard-poultice.—*Ibid.*

Preparation of pure Nitrogen.—Pure nitrogen is obtained in abundance according to E. Marchand, by submitting to distillation in a retort, a solution of chloride of lime and caustic ammonia.—*Jour. de Chim. and Chem. Gaz.*

Preparation of Carbonate of Potash free from Silica from ordinary Pearl Ash.—One pound of pearl ash is dissolved in one pound of rain water, and four ounces of finely pulverized vegetable charcoal are added to it; it is left for twenty-four hours, being frequently stirred and then filtered. On evaporation and saturation with an acid it will be found not to contain a trace of silica which is otherwise so difficult to remove.—*Jour. für Prakt. Chem. and Chem. Gaz.*

THE

AMERICAN JOURNAL OF PHARMACY.

JULY, 1845.

ART. XIX.—NOTICE OF SOME BRAZILIAN DRUGS.

By J. Carson, M. D.

We have been placed in possession of specimens of a few drugs peculiar to Brazil, through the kindness of Mr. Edward Donnelly, formerly of this city, and a graduate of the College of Pharmacy of Philadelphia, but at present, a resident of Rio de Janeiro. Most of them appeared to us interesting and worthy of notice, more especially, as they are presented as remedies in the "*Formulario ou Guia Medica do Brazil.*" This work is compiled by *Dr. Chernoviz,* and is as replete with information and as carefully prepared as any of a similar kind in other languages. It in fact answers the purpose of a Pharmacopœia in Brazil, and to it we shall refer as each article is presented.

Gum Angico.

This product is derived from the *Acacia jurema* of *Martius.*

The gum occurs in rounded masses or tears, the size of a walnut, generally united in lumps presenting a nodulated appearance. The colour is reddish. The surface is somewhat rough and cracked. When broken, it is beautifully clear and transparent, and resembles gum Senegal. It is perfectly odorless, and has a mucilaginous slightly starchy taste, like tragacanth. It pulverizes with some difficulty on account of its toughness; and when formed, the powder is white and pure like pulverized gum arabic. It dissolves completely, with an oily aspect in solution, but this is not very tenaceous. This gum might be used as a substitute for the ordinary gums of the shops—but we are induced to believe, that it is inferior for many purposes to which they are applied.

The bark of the tree is stated (op. citat.) to be a powerful astringent, and is used in the form of decoction.

Fedegoso Root.

This is stated to be the root of the *Cassia occidentalis*, L., by M. August. St. Hilaire, but by Vandelli it is referred to the *C. hirsuta,* which is closely allied to the preceding. It has herbacous stems with opposite leaves—leaflets broadly ovate-acuminate and hirsute. The odour is disagreeable.

The root is in pieces of the thickness of the finger, ligneous internally, and covered with a thick cortical substance, hard, wrinkled and black externally. In the dried state it is almost entirely destitute of odour, and has a bitter disagreeable taste.

It has been examined by Cadet and Henry, Journ. de Pharmacie, vol. iii., p. 259—and vol. vi. p. 189.

In Brazil this drug is used as a febrifuge, and in the "Formulario" we are told that it is diuretic, and a mild tonic employed in dropsies. Margraff states that it is used as an antidote, (for what, is not specified,) and as a remedy in strangury.

It is employed in decoction, from 1 to 2 ounces to a pint of water. The leaves are also used. Pison informs us that the juice of them is given in injection to allay inflammation of the anus, and as an application to erysipelas.

Herva Tostao.

This is the root of the *Boerhævia hirsuta, Wild.*, a plant belonging to *Monandria, Monogynia,* L., and to the natural family *Nyctagineæ.*

Calyx very entire. *Corolla* campanulate, W. Leaves ovate, repandate. Stem diffuse, pubescent. Fruit, sulcate, clavate, *Swartz.* It has been confounded with *B. diandra.*

The root of this plant is fusiform, elongated, thick as the finger above, very tapering to the extremity, with a number of branching radicles; brown externally, with transverse warty elevations of the cortical substance, and wrinkled spirally. Internal structure spongy, fibrous; fracture tough, and of a light colour; odor feeble; taste starchy.

In the Dictionary of Lamark the plant is known by the name of *Patagone.*

This drug is stated to be diuretic, and is employed in gonorrhœa (op. cit.) in the form of decoction, made of 2 oz. to a pint of water. Externally it is used in the form of cataplasms.

The juice of the leaves is employed in Brazil, according to Martius, in jaundice, and induration of the liver.

Other species of Boerhævia are also used in the treatment of disease in Brazil, as the *B. scandens* as a diuretic, and the *B. tuberosa,* which is a purgative.

Guarana.

This, is the gum resinous concrete of the fruit of the *Paulinia sorbilis,* of Martius. *Class Octandria, Order Tryginia, L. Nat. Fam. Sapindaceæ.*

The plant is an inhabitant of *Para.* In the 12th vol. of this journal, page 340, will be found all that is known of the plant, in an interesting memoir by M. Virey.

The drug is prepared by the Indians of Para, and is in the form of cylindrical masses, elongated, and smaller towards the extremities, weighing from four to eight ounces. Externally, the surface is smooth, and of a dirty blackish brown colour. It is very hard, and breaks with a short, brittle fracture, presenting a deep brown, somewhat shining, irregular surface, a little mottled. It has no odour, and its taste is astringent, very slightly bitter, and decidedly possessed of the chocolate flavour. The powder is of a light chocolate colour.

By M. Cadet it was found that it was partly soluble in alcohol, partly in water, and that there remained an insipid, insoluble matter. M. Batka pointed out the existence of a peculiar principle to which has been given the name of *guaranine.* The most elaborate analysis, however, made of it, has been by M. Berthemot and Dechastelus, who determined *guarana* to contain, independently of pulp, starch, &c. a greenish oily matter, tannic acid—affording greenish ferruginous salts, and a *crystalline* substance. This latter is the *guaranine* of M. Batka, which the last mentioned experimenters have determined to be identical with *caffein*, and to be in union with tannic acid. In the "Formulario" this article is mentioned as a tonic and astringent, administered in the form of infusion or decoction. For a more detailed statement of the modes of exhibition the reader is referred to page 54, vol. 13th, of this Journal, by M. Dechastelus.

Extract of Guarahem or Buranhem.

Under this name has been sent to us the article known as *Monesia*, which two or three years since attracted the attention of the public. In the "Formulario" it is referred to a species of *Chrysophyllum*, but this is extremely questionable. For an exposition of this subject, we may refer to the notice of Monesia at page 152, vol. 13, of this journal.

Brazilian Bark.

The specimens which under this designation have been sent to us consist of quills from 3 or 4 to 18 inches in length, an inch in diameter, and 2 lines in thickness, either singly or doubly rolled. Externally they are covered with a smooth epidermis of a brownish or ferruginous, and somewhat micaceous appearance, which is wrinkled from drying, and marked with transverse superficial fissures. The substance beneath, where the epidermis has been pealed off, is brown, and marked by shining minute apparently crystalline specks. Internally the surface is smooth, and of the same brown colour. The fracture is short and somewhat splintery. They have a tanlike odour, and a marked bitter taste. From the examination to which they were subjected by Mr. Procter, no evidence of the existence of an organic base was afforded.

The plants affording a variety of barks derived from Brazil, were placed by St. Hilaire in the genus Cinchona, from this however they have been separated by De Candolle, and erected into a new genus under the name of *Remijia,* in honor of a surgeon named Remijo, who introduced the use of their bark in Brazil as a substitute for Cinchona.

Their characters are as follows: *Cal.* tube obovate, limb persistently five-cleft. *Cor.* tube terete, limb five-cleft, laciniate, linear. *Stam.* filament inserted in the middle of the tube, inequal; anthers linear, entirely included. *Capsul.* ovate, bilocular, crowned with the calyx, locularly dehiscing, or according to St. Hilaire, dehiscing from the septum; the valves bifid from the base to the apex. Placentæ fleshy in each cell. *Seeds* many, imbricate peltate, alated on the margin. They are Brazilian trees—hardly racemose—called *Quina de Serra,* or *Quina de Remijo.*

The leaves are oblong or ovate, coriaceous, below profoundly sulcate, opposite or ternate, revolute on the margin, beneath villose and ferruginate. Stipules lanceolate, connate at base and deciduous. Branches axillary elongated, interrupted, the fascicles of flowers opposite. Corrolla on the outside tomentose.

This genus differs from Cinchona in the capsule, which semilocularly dehisces; in the seeds, which are peltate, and in the inflorescence and habit. (De Cand. Prodrom. vol. 4, p. 359.) Four species that have been enumerated, are the R. *ferruginea,* R. *Vellozia,* R. *Hilarii* and R. *paniculata.* It appears to us probable that the first mentioned affords the article that has been described. It is figured in the "*Plantes usuelles des Brasiliens*" of St. Hilaire.

In the "Formulario" a general notice is given of this bark, with the information that its qualities are similar to those of the Peruvian barks.

Bark of the Paú Pereira.

This article is referred to a species of *Vallezia* belonging to the family of *Strychneæ*. It is the inner layer of the bark, immediately in contact with the wood.

The specimens are in flat pieces eighteen inches in length, 3 in width, and 3 or 4 lines in thickness, of a light brown colour, very fibrous and stringy, with little odour, and a very bitter taste.

From the analysis of Prof. Pfaff, it appears that it contains an *alkalineprinciple* (*pereirina*,) resinous extractive, starch and a vegetable acid, with salts of potassa, lime, magnesia, &c. The discovery of the alkaloid principle is first to be attributed to Sr. Santos of Rio de Janeiro.

This drug has some reputation as a remedy in intermittent fever in Brazil, as in the hands of numerous practitioners it has proved serviceable. A preparation called "*Agua antifebril*" is used, which we presume is an infusion of it. It is employed internally and externally. (*Formulario.*)

ART. XX.—OBSERVATIONS ON MONARDIN, A PECULIAR CRYSTALLINE SUBSTANCE, DERIVED FROM THE VOLATILE OIL OF MONARDA PUNCTATA.

BY WILLIAM PROCTER, JR.

THE volatile oil of horsemint (*Monarda punctata*) is extensively employed in this country as a rubefacient, either by itself, or in conjunction with other substances, in the form of liniments, and from its great pungency is considered a valuable remedial agent. Several of our druggists* have observed

---

* The specimen of Monardin which furnished the material for this essay, was presented to the College of Pharmacy of this city by Edward Wayne, about a year since, with the remark that the canister from which it was taken contained a very considerable deposit of this substance. Samuel F. Troth and Charles Ellis have likewise observed this phenomenon.

in some specimens of this oil, a crystalline deposit, analagous in appearance to camphor, and possessed of the taste and odour of the oil. As no notice has been taken of this fact in any of the works to which I have had access, the subject is possessed of sufficient interest to present, in the form of an essay, a history of its sensible properties, and some of its chemical characteristics. It evidently belongs to the camphor class, and may be the result of the absorption of oxygen. It is presented in two forms; one in amorphous translucent masses with some slight evidences of lamination in the fracture; the other in rhombic crystals closely aggregated together. The amorphous variety is white, has a conchoidal fracture, is very friable, and is reduced to powder with extreme readiness. Its amorphous condition appears to be due more to the manner in which it is deposited, than to any difference in its chemical character, as when fused, and gradually cooled, it assumes the crystalline form, and comports itself in the same manner with chemical reagents. This substance, which for the purpose of facilitating its description, may be called *monardin*, possesses the burning pungent taste, and peculiar odour of the oil of horsemint, and doubtless possesses the same medical properties. Monardin is very soluble in alcohol and ether, and is dissolved by the fixed and volatile oils, particularly oil of turpentine; hence the change of the oil of horsemint to the solid state, does not preclude its use in pharmaceutical preparations. It is very slightly soluble in water, communicating to that fluid its odor and pungent taste. Monardin fuses at 118° Fahr. into a limpid oil, and when the heat is continued it commences boiling in a glass vessel at 418° Fahr., and at 438° its point of ebullition is stationary. It boils readily and without discoloration, and may be distilled *per se* without change, the vapour condensing in a crystalline form if the receiver be kept cool. Fused monardin may be cooled down below 70° without solidifying, but if the smallest crystal of the substance be dropped in it, crystallization commences, and is propagated throughout in a few minutes. The usual crystalline form of monardin is the rhombohedron or some form derivable from it. By cooling a portion of fused monardin until crystallization is partially effected, and then pouring off the superstratum, it is obtained in very regular crystals. The sp. grav. of the amorphous variety is 1.03. When in crystals the enclosed air renders them lighter than water. It is neutral to test paper.

Monardin is soluble in a solution of caustic potassa, and by saturating the alkali with acetic acid it separates in the form of an oil, which, by standing, assumes the same crystalline form, and possesses the same odour as before subjection to the alkaline menstruum.

When crystals of monardin are placed in a solution of ammonia they gradually assume the form of oily globules, without dissolving in the ammoniacal liquid, and remain at the bottom. Whilst undergoing this change they have the appearance of fusing. The globules of monardin, after treating with ammonia, solidify when subjected to a temperature as low as 18° Fahr. By exposure to the air these globules gradually assume a purple colour, and when heated with caustic potassa no ammonia is evolved.

When crystallized monardin is introduced into a jar of ammoniacal gas over mercury, the ammonia is rapidly absorbed, and the crystals are liquified. When suffered to remain until saturated, they absorb nearly one hundred times their bulk of the gas, and are increased in bulk more than fifty per cent. When the liquified monardin is exposed to the air, it gradually assumes the crystalline form apparently unchanged. Oil of horsemint also absorbs ammonia, but not by any means in so great a quantity, or with any marked phenomena.

Monardin dissolves in cold concentrated sulphuric acid, to which it communicates a red tinge. The solution may be diluted and saturated with an alkali without the separation of any oily or crystalline matter, evidently proving that the monardin is changed.

Concentrated hydrochloric acid appears to have little, if any, action on this substance, either cold or hot; when it is treated with cold, strong nitric acid, it is rapidly decomposed with the evolution of much deutoxide of nitrogen and the production of heat—after the action ceases, a thick yellowish brown mass remains, without any appearance of crystallization.

Having obtained a bottle of ol. monardæ, in which the monardin was in process of being deposited in crystals, the latter were separated from the super stratum of oil, and were found to possess the same properties as the other specimens previously examined. When this oil was subjected for some time to a temperature of 18° Fahr. a considerable quantity of similar crystals of monardin were deposited. The oil thus rid of most of the monardin was placed in an atmosphere of oxygen with the view of ascertaining if this principle was the result of the action of atmospheric oxygen upon it; but after forty-eight hours exposure, no evidence was obtained of the formation of that substance, although the experiment was not continued sufficiently long to settle the question.

The particular circumstances favorable to the formation of monardin, and its separation from oil of horsemint is as yet quite obscure. I have known this volatile oil to be kept for many years without any evidence of a deposit, while in another, and a recent instance, about a quart of the oil was taken from a large bottle in which no change had occurred, and in a few hours after, a crystalline deposition had taken place in the portion removed weighing several ounces. In all the instances where this deposit has taken place, the source of the oil was undoubted, having been obtained from the distillers in New Jersey. A careful, ultimate analysis of the oil, and of the deposit, would do much to throw light on this subject.

ART. XXI.—NOTE ON TESTS FOR LEAD.

BY AMBROSE SMITH.

Having recently had occasion to examine acetate of potassa, which was contaminated with lead, and finding that the lead, although readily recognized by means of sulphuretted hydrogen, could not be detected by iodide of potassium, we were induced to make a few experiments, with a view of determining the relative delicacy of some of the tests for this metal.

Iodide of potassium.—We found that a solution of acetate of lead containing one part of acetate in 900 of water could be distinguished by iodide of potassium, striking a greenish yellow. When the solution contained one part in 1000, the iodide of lead entirely dissolved, forming a colourless solution. Iodide of lead is stated to dissolve in about 1200 parts of water, but we find it to be soluble to a somewhat greater extent when in the nascent state.

Ferrocyanide of Potassium.—One part of acet. lead in 10,000 water, formed on the addition of ferrocyan. potass. a white opalescent turbulence; one part in 15,000, a milkiness scarcely apparent.

Sulphuretted hydrogen.—One part acetate in 100,000 water, showed distinctly with sulphuretted hydrogen, the solution becoming brown; with one part in 120,000, a change was produced that could be recognized. A test tube ½ inch in diameter was employed in each experiment. Hence it appears that ferrocyanide of potassium as a test for lead is ten times,and sulphuretted hydrogen one hundred and twenty times more delicate than iodide of potassium.

The difference is still greater when the solution containing the lead, contains also a salt of potassa or soda. In a strong solution of acetate of potassa, containing 1-100th, of acetate of lead, no change was produced by iodide of potassium. When the solution contained 1-60th, it was coloured yellow by the iodide of potassium; but on shaking the liquor, the iodide of lead entirely dissolved, forming a colourless solution. A similar effect occurred in solutions of acetate of soda, and tartrate of potassa containing lead, varying to some extent with their degree of concentration, and it is probable it occurs with most of the salts of these alkalis. When to the liquor containing the precipitated iodide of lead, sulphate of soda or carbonate of soda or potassa is added, the yellow colour disappears, leaving a white precipitate; the iodide of lead being replaced by sulphate or carbonate of lead. It is evident therefore that we cannot rely upon iodide of potassium as a test for the presence of lead in a salt of potassa or soda. We do not find that their presence effects the action of sulphuretted hydrogen if the proper precautions are observed, and so far as we have examined, this gas is the most delicate test for this metal.

From economical reasons the acetates of potassa and soda, are frequently made by mixing solutions of acetate of lead and carbonate of potassa or soda, carbonate of lead precepitating and acetate of the alkali remaining in solution; but this solution constantly retains a trace of lead, even if the alkaline salt be in excess. The lead may be entirely separated by passing sulphuretted hydrogen through the solution, until no further change is produced, and afterwards boiling it for some time in order to drive off the excess of the gas, and facilitate the precipitation of the sulphuret of lead. It will be necessary after boiling to add sufficient acetic acid to neutralize the solution if, as is generally the case, it has become alkaline.

ART. XXII.—NOTE UPON SESQUINITRATE OF IRON.

By Augustine Duhamel.

A formula for the preparation of this substance in solution is given in the last edition of the U. S. Dispensatory.

Prepared, as there indicated, it furnishes a transparent deep red solution Agreeable to the recommendation of Mr. Kerr, by whom the formula is given, and with the view to prevent decomposition some hydrochloric acid is added, in quantity so small as not to affect its medicinal action, but sufficient, as he supposed, to preserve its character as a sesquinitrate of the sesquioxide of iron. This object, however, is not accomplished. Not only myself, but others have invariably found that, after a few weeks standing, the solution becomes wholly turbid and incapable of passing clear by filtration; the further action of time occasions a spontaneous deposit of a floculent ochrey oxide, while the clear fluid stratum is changed to a light reddish yellow colour, and is less dense than the original solution.

In accounting for this change, the first question which presents itself is relative to the true constitution of the preparation. Is it a sesqui-nitrate of sesqui-oxide of iron in solution? According to Thenard, "always in treating iron by nitric acid, this metal passes to at least the state of oxidation represented thus: $Fe\,O + Fe^2\,O^3$." This formula is that of the black or magnetic oxide of iron, and the existence of the iron in this state is proven by adding ammonia, which throws down the black oxide in a hydrated form. Hence the change which occurs in the medicinal solution is owing to the peroxidation of the equivalent of protoxide of iron, and the consequent precipitation of at least a portion of it in the form of the ochrey sediment. The change may be thus explained: $6\,(Fe\,O, Fe^2\,O^3 + 4\,NO^5) + O^3 = 8\,(Fe^2\,O^3 + 3\,NO^5) + (Fe^2\,O^3.)$

It follows from this, that every six equivalents of the nitrate of the black oxide by absorbing three equivalents of oxygen, becomes converted into eight equivalents of the sesqui-nitrate of the sesqui-oxide, and one equivalent of sesqui-oxide, which precipitates.

From these facts it is evident that the name of this preparation is chemically incorrect, as it is the nitrate of the black oxide, and may be represented thus: $Fe\,O, Fe^2\,O^3 + 4\,NO^5 + aq.$

Under these circumstances it becomes necessary to change the form of administration from that of solution to a syrup, to ensure permanency of character and effect. Such a preparation, Dr. Hays, of this city, tells me he has been using for several years. In making it I have pursued Mr. Kerr's formula, using, however, only half the quantity of water, and dissolving in this a little less than twice that proportion of sugar. The unnecessary hydrochloric acid I dispense with.

Take of iron wire free from rust and cut in pieces	6 drs.
Nitric Acid - - - - - -	f.1½ oz.
Water - - - - - - -	f.8 oz.
Sugar - - - - - - - -	14 oz.

Add to the iron the acid previously mixed with the water, and set aside the mixture for twelve hours, that the acid may be saturated. Decant the liquor from the undissolved iron, add the sugar which you dissolve in it by heat, and finally strain.

It has been found to keep in this form, and is doubtless improved as well in taste as in appearance.

Its properties are all tonic and astringent.

ART. XXIII.—NOTE ON ADULTERATED OPIUM.

By C. Ellis.

The determination which is manifested on the part of many of the respectable importers and dealers in drugs in this country, to prevent the introduction into our markets of spurious and adulterated articles, is highly creditable.

One of the leading objects of the American Journal of Pharmacy will thus be promoted; and the public be placed on their guard against a species of fraud, which, if it were less criminal in its nature and fraught with less injurious consequences to the health and even lives of our citizens, might be viewed with a modified degree of indignation.

The following is extracted from a letter from David Taylor of London, addressed to the house of N. Lenig & Co. of this city, and politely furnished by these gentlemen for publication; accompanied by a printed article taken from the Pharmaceutical Journal of London, by "T. N. R. Morson." The letter states : "We regret (that) we were unable to obtain a sample of the adulterated opium. The holders refused to let us have one, although they had promised it. Part of the parcel has, we believe, been shipped to New York and Boston. One of our morphine manufacturers has communicated the results of experiments upon the parcel referred to, which appears to be adulterated with wax and india rubber. We enclose the article extracted from the Pharmaceutical Journal, which will interest you."

ON A NEW VARIETY OF OPIUM.

By Mr. T. N. R. Morson.

The importance attached to all matters relating to the complex chemical nature of opium, more especially such as affect its narcotic powers, or render it in any way unfit for the use of the Pharmaceutical Chemist, will be sufficient excuse for my presenting to the Society, in an imperfect state, a few observations on what is to me a new form of this drug, and one which has recently excited some little attention among purchasers.

Several chests of opium have been lately imported from Turkey, having, both in the size and weight of the lumps, and general external appearance, a very close resemblance to that variety known as Constantinople opium, so justly celebrated for its strength and purity, and which yields the largest proportion of morphia. A close observer, however, would see in the opium in question sufficient difference to attract his attention, it being unusually soft, and of unusually light colour; but these differences are by no means evidences of impurity, and consequently the opium found ready purchasers. Having been requested to give an opinion respecting its strength, I proceeded to examine it in the usual manner, and soon found it to differ materially from any specimen I had previously examined.

It is exceedingly difficult with this opium to obtain a bright aqueous solution, for whether cold or hot water be employed, the solution filters, even through cloth, with great difficulty, and if much concentrated, will not filter at all without constant change of the filter, and consequent loss of product. My first impression was, that it was altogether spurious, but having separated from it morphia, codea, meconic acid, and other of the usual constituents of opium, and considering these in connexion with its light colour and herbaceous odour, it appeared probable, at least, that the observable difference might result from a different mode of collection, and therefore that it required a more careful examination.

Sixteen ounces of the opium, divided into small pieces and placed in a moderately heated stove until sufficiently dry to be reducible to coarse powder, lost three ounces in weight: this, after pulverization, was boiled in successive portions of alcohol, until eight pounds of this fluid had been employed, and filtered while boiling hot. The first solution became, on cooling, nearly solid; and even the last, although colourless, was sensibly turbid. These solutions filtered readily when perfectly cold, leaving a bulky gelatinous looking mass, equal in volume to the quantity of opium employed, but which by pressure was reduced to a small bulk, and when dry was in weight about one ounce, and consisted almost entirely of a substance resembling wax, combined with an elastic matter resembling caoutchouc.

The opium, after treatment with alcohol, was then boiled in pure sulphuric ether, until all matter soluble in that fluid was removed, and the evaporated ether left one ounce of the waxy substance in a pure state, which, with the other products, is on the table.

My next object being to ascertain the quantity of morphia, the filtered alcoholic solutions were distilled, and the matters remaining in the water-bath acted on with distilled water to separate the resinous matter insoluble in that fluid and in the natural acid of the opium. The aqueous solution, treated in the usual manner, gave one ounce of slightly colored morphia. It also contained other principles common to opium.

The unusually large quantity of wax and caoutchouc contained in this opium, and the diminished quantity of morphia, render it quite unfit for general use. A microscopic examination of the insoluble part, which, unlike many other Turkey opiums, is in a state of minute division, shows it to have been largely mixed with the capsule of the poppy; and it is, therefore, probable that this opium is obtained by expression, instead of incision; or at least is very largely mixed with the expressed matters so obtained, and the powdered external coat of the capsule.

ART. XXIV.—ESSAY ON THE PURPLE FOXGLOVE (DIGITALIS PURPUREA.)

BY M. HOMOLLE.

THE author commences this treatise, which obtained the prize offered by the Societe de Pharmacie, with a general account of the several memoirs hitherto published on this subject, and then describes some preliminary experiments, previously to arriving at the following process for eliminating the principle digitaline in a pure and crystalline state.

2 lbs. of the dried leaves of *Digitalis*, coarsely powdered and previously moistened, are conveyed into a displacement apparatus, and treated with water. The mixed liquors obtained are immediately precipitated with a slight excess of subacetate of lead, and thrown on a filter. They pass limpid and nearly free from colour, preserving all their bitterness, and presenting a slightly acid reaction. Some dissolved carbonate of soda is added until no further precipitate is formed. The liquid is filtered anew, and freed from lime which it still retains by oxalate of ammonia, and afterwards from salts of magnesia by ammoniacal phosphate of soda.

The filtered liquor presents an alkaline reaction, is clear, of a yellow brown tint, and excessively bitter; a slight excess of a solution of tannin is added to it, and the precipitate formed collected on a filter and dried between folds of blotting-paper, and then mixed whilst still moist with one-fifth of its weight of powdered oxide of lead. The soft paste which results is thrown on a filter to drain, pressed between blotting-paper, and finally dried in a warm chamber. It is then powdered and extracted with strong alcohol.

The alcoholic solution, sufficiently evaporated at a gentle heat leaves as residue, in the form of a yellowish granulous mass with a small quantity of supernatant mother-ley, the bitter principle, still retaining some traces of oil, salts and extractive substances.

This mass is washed with a little distilled water, which removes any deliquescent salts, without perceptibly dissolving the bitter principle. It is left to drain, and again dissolved in boiling alcohol, with the addition of a sufficient quantity of charcoal, washed with hydrochloric acid; it is then boiled and thrown on a filter. The liquid passes colourless; left to spontaneous evaporation in a warm chamber, the substance is partly deposited on the sides of the dish in the form of thin, light, semi-transparent layers, and partly at the bottom of the vessel in the form of agglomerated whitish granular flakes.

The perfectly dried product is reduced to powder and treated with rectified æther. It is left 24 hours in contact, then boiled and filtered. This æthereal solution, on spontaneous evaporation, leaves a slight crystalline white layer, consisting of a certain proportion of the bitter principle, a trace of green oleo-resinous matter, a substance whose odour calls to mind that of *Digitalis*, and of a substance crystallized in beautiful white needles, without smell, of an acrid and rather sharp taste, insoluble in water and alcohol, fusible at about 302° Fahr., and upon cooling forming a yellow radiated crystalline mass. The small quantity we have been able to isolate has not permitted us to ascertain its other properties. We shall pursue the investigation of it as soon as we obtain a sufficient quantity.

An experiment made on 250 grs. of aqueous extract of digitalis, prepared with care, which was redissolved successively in alcohol and water, did not enable us to obtain the bitter principle solid and completely isolated. We thence concluded that the heat required for preparing the extract, altered this matter still combined with the bodies which accompany it in the plant.

Another experiment made on 2 qts. of juice of fresh digitalis, yielded a beautiful product; but the very small proportion seemed an objection to this method of preparation, independent of the very great convenience of only being able to employ this process at a certain period of the year.

The fermentation which the presence of a small quantity of sugar in the plant caused in the liquors, however little the temperature was raised or the operation prolonged, the result of which was always the precipitation of a small proportion of altered bitter matter, induced us at first to add to the water with which the digitalis was exhausted one-tenth in volume of alcohol; we also hoped by this means to avoid the solution of a part of the salts of lime and magnesia. We have had to abandon this addition, which renders the process more expensive without affording better results. In general it is best to carry on each operation rapidly, and to avoid a temperature exceeding 50° or 54° Fahr.

We pass on to the study of physical and chemical properties of the principle which we have isolated, leaving it the name of digitaline, which former chemists have assigned to it by anticipation. Digitaline is white, colourless, difficult to crystallize, and assuming most frequently the form of porous warty masses or of small laminæ. It is so intensely bitter that the 15th part of a grain suffices to communicate a decided bitterness to 2 quarts of water. The taste of the solid digitaline is however slow in developing itself, owing to its sparing solubility in water.

It causes violent sneezing when it is powdered or agitated carelessly, even in small quantities

Digitaline dissolved in water or alcohol is without action on red or blue litmus-paper; it is therefore a neutral substance.

A sample of this substance, purified with great care by alternate solutions and washings, without the use of charcoal, for fear of introducing foreign matters, was employed in ascertaining the following properties:—

Exposed in a tube to the action of heat of an oil-bath, it began at 356° to be slightly coloured; at 392° it had become brown; and towards 400° it began to soften to a sort of paste, which swelled, appearing to acquire a lighter tint from the interposition of gaseous bubbles. The temperature having been carried by degrees to 428°, the substance diminished in volume, re-acquiring the brown tint which it had at 392°. When tasted after this experiment, it had lost a great part of its bitterness, and had acquired an acid, astringent taste.

Another portion, heated in the air on a slip of platina, became at first soft, then took fire and burnt briskly, but with a somewhat dull and smoky flame. No visible residue is left; but on moistening the spot with a little distilled water it becomes alkaline. The same phenomenon has been observed to a certain extent upon burning a small quantity of perfectly pure crystallized morphine. If the digitaline is not in a pure state, it burns, forming a very high porous mass, which disappears entirely if calcination be continued.

A portion burnt in a glass tube diffuses acid vapours. If it be heated with a fragment of potash, the vapours are alkaline; but as this occurred when experimenting for comparison on some pure salicine, we considered that it was due to a phenomenon similar to that described by MM. Faraday, Reiset and Gerhardt, and that the nitrogen here disengaged in the form of ammonia did not originate from the digitaline.

We were desirous of verifying the presence or absence of nitrogen by M. Lassaigne's process, and experimented comparatively on digitaline, salicine and morphine. In the first two cases we only obtained a faint greenish yellow tint, which we attributed to the persalt of iron, and with the morphine a slightly bluish emerald-green tint. Although these last results were not as decided as we had expected, for with morphine, a nitrogenous substance, we ought to have obtained a beautiful dark blue tint, yet as they were constantly the same in several experiments, we regarded them as confirmatory of our first conclusion, viz. that digitaline is not a nitrogenous compound.

Cold water dissolves a little more than 1-200th, boiling water about 1-500th; no opacity results on cooling. During the evaporation of the two solutions a part of the matter separated in the form of white flakes, and on the sides of the vessel some yellowish stripes formed, probably arising from an incipient decomposition of the digitaline by the heat employed for the evaporation. The best solvent for digitaline is alcohol. It takes up a large portion in the cold, and still more when heat is applied. The boiling solution, however, does not form any deposit on cooling. When digitaline has been purified by æther, it appears to dissolve with rather less facility in alcohol. The alcoholic solution, left to spontaneous evaporation, deposits the digitaline partly in a pulverulent, partly in a crystalline state. Towards the end of the evaporation the liquid often forms a kind of hydrated mass, which, after entire desiccation, takes the form of warty crusts. Concentrated æther dissolves so much the less of this bitter principle, the lower its density.

Action of Acids.—We have not been able to form any combination of digitaline with acids. This result was probable from the neutrality of this principle.

Digitaline becomes black directly it is placed in contact with concentrated sulphuric acid, and soon forms a solution which appears blackish-brown, when examined in a thin layer; after some time this colour passes successively into reddish brown, smoky amethyst, pure amethyst, and finally to a beautiful crimson. If during this interval a portion of the solution is added to a small quantity of water, a clear beautiful green solution results. Concentrated hydrochloric acid quickly dissolves it, communicating to the liquid a yellow tint, which after a few instants changes to a beautiful emerald green, and becomes darker and darker until it is of a dark green. In about an hour's time the liquor becomes turbid, and the matter at first dissolved is precipitated in the form of green flakes floating in a greenish yellow liquid. In the course of two days the flakes have become of a blackish green colour.

Digitaline does not dissolve in phosphoric acid, but merely acquires a slightly greenish tint after two or three days.

In pure concentrated nitric acid digitaline readily dissolves, with disengagement of reddish vapours, and forming a beautiful orange-yellow solution. The following days the solution changes to a golden yellow colour, and so remains.

In all the above reactions the digitaline is more or less immediately destroyed.

Acetic acid dissolves digitaline without colouring or changing it, at least as quickly as the concentrated mineral acids.

Action of Potash.—A little potash added to an aqueous solution of digitaline causes the bitter flavour to disappear slowly; but if the mixture be evaporated to dryness, the bitter taste gives place to an astringent one.

The singular property which alkalies possess of destroying the bitter taste of certain bodies had already been noticed by M. Bouchardat, with respect to synisine and lactacine; but we should add, that digitaline, submitted to the action of liquid ammonia for more than 10 days, did not appear to undergo any alteration.

We have not found any salt which was precipitated by an aqueous solution of digitaline. A solution of tannin renders the liquor opake white in mass, and opal only if a drop be examined; the precipitate does not begin to form till after 24 hours.

Amongst the different properties of digitaline which we have passed in review, there is one which seems especially characteristic, and which belongs as far as we are aware, to no other substance; it is that of forming a beautiful emerald green solution with concentrated hydrochloric acid. This reaction is the more valuable, as a particle of this substance placed in a tube with 2 or 3 drops of hydrochloric acid is sufficient to develope the green colour after a few instants; and we think that this character ought to form the proper criterion for discovering digitaline in medico-legal or analytical researches; afterwards will come the action of sulphuric acid and that of acetic acid.

The conversion of digitaline into an acid astringent principle, on the one hand by the influence of heat, and on the other by potash, joined to the slight alteration which we observed during the evaporation of the aqueous solution, indicate in a practical point of view, that the employment of heat must be very unfavourable in making the pharmaceutical preparations which have digitalis for basis, and that care must be taken not to add alkaline salts to them.

We have seen that pure digitaline is scarcely soluble in water; we must not, however, conclude from this that this agent is unfit to dissolve the active principle of the plant. In the *Digitalis* it occurs in combination with saline and extractive matters, which favour its solubility in this medium.

Digitaline which has not been purified by æther retains, as above stated, a green matter, an odoriferous substance and a crystallizable principle, and is known by its peculiar odour, calling to mind that of *Digitalis*. It dissolves but imperfectly in hydrochloric acid, so that the liquor remains turbid, but presents the same intense green colour. It moreover leaves some light flakes on solution in acetic acid.

The author has not submitted the digitaline to elementary analysis, not having been able to obtain it perfectly pure in sufficient quantity, the amount in the plant being extremely minute.—*Chem. Gaz.*

ART. XXV.—PHYSIOLOGICAL AND THERAPEUTICAL ACTION OF THE BITTER PRINCIPLE OF DIGITALIS.

M. HOMOLLE exhibited the bitter principle to a rabbit, introducing 5 centigrms. into the cellular tissue of the thigh; it produced anxiety, trembling, and reduction of the pulse from 148 to 124; 10 centigrms. reduced it from 108 to 102, it subsequently rose to 144. 15, 20 and 30 centigrms. were afterwards given, and reduced the action of the heart 24 to 30 beats. During these experiments there was no vomiting; the state of the urine could not be satisfactorily ascertained. It was found that a fifth part of the quantity, which when taken into the stomach acted as a poison, produced the same effect when inserted beneath the skin. 5 centigrms. given to a dog had no effect upon the pulse, but produced vomiting. A similar dose, repeated also, produced vomiting, a bloody stool, and increase of the pulse from 148 to 154. 5 centigrms. inserted beneath the skin caused staggering, hiccough and trembling, and raised the pulse to 184, the action of the heart becoming irregular and tumultuous. 1 centigrm. applied to a blistered surface on the author's arm, in one instance reduced the frequency of the pulse, in another increased it, with occasional intermission, producing headache, dimness of sight and lassitude; the urine was diminished in quantity. 2 centigrms. produced analogous effects.

The author remarks that 1 centigrm., endermically applied, is sufficient to produce all the poisonous effects, as headache, dimness of sight, general debility, shivering, diminished urinary secretion, irregularity and intermittence of the pulse, without alteration in its frequency. 5 milligrms. taken internally produced very similar symptoms, slight diminution of the frequency of the pulse, debility and dimness of sight, normal quantity of urine, sometimes vomiting, increased frequency of pulse on assuming the erect posture; after the exhibition of the medicine was withheld the quantity of urine was much increased.

In a severe case of pleurisy and pericarditis complicated with anasarca, deficiency of urine, which was bloody, orthopnœa, tumultuous action of the heart, with a pulse which could not be counted, digitaline in the dose of 2 milms. repeated three times, was followed by the evacuation of 3 pints of limpid urine, and the pulse was reduced to 120 and regular. Four pills of 4 milligrms. were given during the next day, the urine continued abundant, the pulse was 96, occasionally intermittent; by the continuance of the medicine the pulse was finally reduced to 54, with occasional interruptions; the patient was afterwards completely cured. In the case of simple pleuritic effusion, digitaline appeared to hasten the absorption of the fluid. Its diuretic action was also well-marked in a case of nervous palpitation.

M. Solon not only has confirmed the experiments of the author, but even has found the digitaline more active than he did. He always observed that in a dose of 1 to 3 milligrms. in the day, its action on the circulation was marked, and reduced the pulse from 72 to 55 in the minute; the poisonous effects were always observed when the dose of the substance amounted to 1 centigrm. per diem. The diuretic action observed in some of the above experiments has not been confirmed. M. Solon concludes from his observations, that the dose of the digitaline should be from 1 milligrm. to 1 centigrm.*

Ibid.

---

* As the therapeutic actions of medicinal substances do not come within our limits, we have been obliged to curtail these experiments considerably.—Ed. *Chem. Gaz.*

ART. XXVI.—EXPERIMENTS ON THE FORMATION OF LACTIC ACID FROM SUGAR-CANE.

By Prof. H. Von Blucher.

1. With a view of repeating the experiments of Pelouze and Gelis on the formation of butyric acid, the author added to a solution of 1800 grms. of cane-sugar in 9500 grms. of water some well washed caseine, and finely pulverized chalk, and exposed this mixture in an open glass vessel for 4½ weeks, in a drying chamber, at a temperature of from 86° to 94°, agitating it almost every day. In the course of 17 days some aggregated crystalline masses separated, which in the course of a few more days increased to such an extent, that being carried to the surface with the ascending bubbles of gas, they formed a compact crust, several inches in thickness, on the surface of the liquid. In 31 days the whole liquid had become converted into a thick crystalline paste. The water which had evaporated during this time had always been restored. The entire mass was now filtered through fine linen and well pressed, again dissolved in boiling water, and exposed in a cold place to crystallize; it yielded 1121 grms. crystallized lactate of lime, which, besides its water of crystallization, contained about 1½ per cent. humidity. This large amount of lactate of lime was perfectly white after the first crystallization, and only acquired a slight brownish tint after long drying. On recrystallization the salt remained white, and was perfectly pure.

2. The author now made several experiments, in which the solutions were exposed to a temperature of 80° to 82°. They all underwent the same change, with apparently the same phenomena. 600 grms. cane-sugar, 2800 water, and 150 grms. moist caseine, yielded with a sufficient quantity of chalk, in the course of 4½ weeks, 469 grms. of well-

dried lactate of lime. The expressed liquid gives a residue of 82·1 grms., containing 16·91 grms. lime.

300 grms. sugar, 1400 grms. water, &c , gave under the same circumstances 213 grms. crystallized lactate of lime. The residue evaporatad in the water-bath, weighed only 29 grms., in which were found 6·01 grms. lime.

These experiments prove, at all events, that 92 per cent. of the constituents of the sugar, which have not escaped in a gaseous state, have become converted into lactic acid, and probably, if we suppose the 6·01 grms. lime contained in the evaporated residue to be combined with 17·2 grms. lactic acid, even 99 per cent.

3. 1400 grms. cane sugar were dissolved in 6000 grms. water and 400 grms. moist (containing 94 grms. dry) caseine, and a sufficient quantity of finely-pulverized chalk mixed with it, and the whole exposed to a temperature of 77° to 86°. For the first 14 days the liquid remained perfectly clear with exception of the sediment, and retained a sweet taste ; but soon the separation of crystalline lactate of lime took place with an apparently considerable evolution of gas, and in the course of 4 weeks the whole mass formed a crystalline paste, as in the previous experiments. After one re-crystallization 870 grms. crystallized lactate of lime were obtained; and the mother-ley, somewhat evaporated, yielded 162 grms. crystallized mannite. The latter however was not perfectly pure, and contained 3·6 per cent. lime, probably in combination with lactic acid. In the liquid separated by filtration and pressure from the mannite, there subsided, on evaporation over the water-bath, a further quantity of minute crystals of mannite. which however could not be isolated from the syrupy liquid, and the whole was therefore evaporated in the water-bath. The residue obtained in this manner weighed 732 grms., and contained 12¾ per cent. lime.

350 grms. of this dry residue were dissolved in 1200 grms water, mixed with caseine and pulverized chalk, and pla-

ced in the warm chamber; in 7 days it had become converted into a crystalline paste, from which were obtained on recrystallization, &c. 210 grms. crystallized lactate of lime. The ley concentrated in the water-bath yielded a residue of 26 grms., in which were found 5·53 lime. If the product of 210 grms. be extended to the entire residue of 732 grms., this would have yielded 439 grms. of the salt; consequently the above 1400 grms. sugar would have produced 1309 grms. crystallized lactate of lime, and estimating the loss approximately at 3 per cent., 1348 grms. Notwithstanding the formation of mannite, therefore, more lactic acid was formed than in the experiments 1 and 2.

That the cane-sugar is not decomposed in the so-called lactic fermentation into mannite and lactic acid, appears to be placed beyond a doubt by the preceding experiments; perhaps however it is first converted into mannite, and this into lactic acid, which is not improbable, judging from the products of decomposition of the residue of 350 grms. To decide, if possible, this question, the author placed a portion of the mannite obtained, mixed with caseine, &c., in the drying-room; but not a trace of any formation of lactate of lime was perceptible after 8 days, nor could the author observe any sign of the formation of mannite in a solution of cane-sugar which had been mixed with caseine, &c., and exposed to a suitable temperature, after the course of 8 days on careful evaporation.—*Chem. Gaz., from Poggendorff's Annalen.*

ART. XXVII.—METHOD OF ASCERTAINING THE QUALITY OF SOAPS.

To determine the quantity of water, thin slices are cut from the edges and the centre of the bars. A portion is then weighed, about 4 or 5 grms. (60 to 75 grs.,) and exposed in a current of air heated to 212° F., or in an oil-bath, until it ceases to lose weight. The dry substance is then weighed; the difference between the first and last weighing will indicate the quantity of water evaporated. If it be a soft soap, it is weighed in a counterpoised shallow capsule. In good soap the amount of water varies from 30 to 45 per cent., in mottled and soft soaps from 36 to 52 per cent.

The purity of soap may be ascertained by treating it with hot alcohol; if the soap be white and without admixture, the portion remaining undissolved is very minute, and a mottled soap of good quality does not leave, when operating on 5 grms., more than 5 centigrms., or about 1 per cent.

If there should be a sensible amount of residue from white soap, or more than 1 per cent. from mottled soap, some accidental or fraudulent admixture may be suspected, silica, alumina, gelatine, &c., the quantity and nature of which may be determined by analysis.

The quantity of alkali contained in the soap is easily determined by means of the alkalimeter.

10 grms. in thin slices are taken, for instance, and dissolved in 150 grms. of boiling water; and this solution is saturated with a normal liquor containing in a quart of water 100 grms. of sulphuric acid, spec. grav. 1·848, or with 1 atom of water.

The volume of this liquor required for complete saturation will indicate the corresponding weight of sulphuric acid, which is itself nearly equivalent to an equal weight of dry carbonate of soda. The quantity of pure potash or soda may be thus deduced.

There is no difficulty in ascertaining in the same assay the quantity of the fatty substance. For this purpose 10 grms. of pure white wax free from water are added to the liquid after saturation with sulphüric acid, and the whole heated to complete liquefaction; it is then allowed to cool, and when it has become solid, the cake of wax and fatty matter which have united is removed and washed, dried and weighed; the augmentation in weight beyond the 10 grms. employed will give the weight of the fatty matter.

The liquid decanted from the solidified wax may afterwards be tested to ascertain the purity of the base.

The solution of the sulphate may also be evaporated, and by an examination of its crystalline form, or by means of chloride of platinum, it may be ascertained whether the base be soda or potash, or a mixture of the two.

As to the nature of the fatty substance it is ascertained, with more or less certainty, by saturating the solution of the soap with tartaric acid, collecting the fat acids, and taking their point of fusion. It is possible, at least, by this to prove the identity or the absence of identity with the sample in the soap supplied, for instance whether it is made from oil or tallow, &c. The odour developed by the fatty acids, at the moment of the decomposition of the soap by acids, assisted by heat, will often indicate the nature of the fatty substance employed in its fabrication, or that at least of which the odour may prevail.

The soap is proved to contain an excess of fatty matter not saponified, by separating the fatty acids by means of hydrochloric acid, washing with hot distilled water, then combining them with baryta, and thoroughly washing the new compound with boiling water. The non-saponified fatty matter is easily separated from the barytic soap, by treating the mass with boiling alcohol, which dissolves the fatty substance. We can moreover assure ourselves that it has no acid reaction on moistened litmus-paper, that it is fusible, and that it possesses the general characters of a neutral fatty substance.—*Ibid, from Chimie appliquée aux Arts.*

ART. XXVIII.—ON THE MANUFACTURE OF BORAX.

By M. Koehnke.

The author gives the following directions for the carrying out of his process:

In the preparation of borax from crude crystallized carbonate of soda and crude Tuscan boracic acid, a solution of caustic soda is prepared, amounting to about 170 lbs. of 1·090 to 1·095 spec. grav., which requires on an average 50 lbs. of soda and 30 lbs. of good caustic lime, the latter mixed to a paste with 4 times its weight of water. When the mixture has been boiled in an iron pan, and converted into caustic ley, it is carefully covered, and after the lapse of a few hours the clear ley drawn off by means of a siphon, the residue again treated with a further quantity of water, well agitated, and the clear liquid again drawn off after a few hours' rest. A further quantity of water is poured over the residue, which is subsequently removed to be employed in washing the crystals of borax obtained.

The leys thus obtained are boiled down to 170 lbs. or to 1·090—1·095 spec. grav., and then 40 lbs. of good Tuscan boracic acid introduced, and further boiled until the ley is reduced to 120 to 125 lbs., or indicates 1·175—1·180 spec. grav.; upon this the liquid is poured boiling hot into a wooden tub which is well surrounded with woolen cloths and straw, and carefully covered to retain the heat as long as possible, so that a good and regular crystallization may be effected.

When borax crystallizes from a warm solution at from

95° to 105°, octahedral crystals are obtained, which contain only 5 atoms of water of crystallization, and consequently entail a very considerable loss in product. This is not to be feared in the above process, but great attention should be paid to the specific gravity of the ley; for if the hot ley, placed aside to crystallize, has been reduced by boiling to beyond 1·180, octahedral crystals are likewise obtained. It should moreover be observed, that the boracic acid, which has been introduced according to the above directions for the first time, is by no means sufficient to convert the whole of the soda into biborate, but an excess of soda has a very beneficial influence on the crystallization. It is moreover advantageous not to remove the dissolved lime from the caustic ley, but rather to add a little free caustic lime, as this serves partially to destroy the sulphates contained in the crude boracic acid. After three days the first crystallization is complete. The crystals are collected and broken, washed with the above mentioned dilute caustic ley, and placed aside; the borax ley, on the contrary is mixed with the wash liquors and placed aside, in order that it may deposit the sulphate of lime formed and any other impurities. As soon as the ley has become clear, it is carefully drawn off, boiled down, and during this operation 8 lbs. more boracic acid gradually added to it, and it is then treated as above. The ley which is now left still requires from 2 to 5 lbs. boracic acid; what remains after this third crystallization may be saturated with sulphuric acid, and obtained as sulphate of soda.

The re-crystallization of all the crystals obtained must generally be repeated twice, for which purpose they are dissolved in 2¼ parts rain water, the ley brought by boiling to the above-mentioned specific gravity, and conveyed boiling hot into a wooden vessel protected from rapid cooling.

The evaporation of the residuous ley is repeated. The crystallization is always terminated within two or three days. There is no need of filtration except on the last re-crystallization. The product amounts, when good substances have been employed, and with careful treatment, to from 60 to 62 lbs. of pure crystallized borax.

The preparation of borax from crude soda and boracic acid is more advantageous, but at the same time more difficult; for this purpose a solution of caustic soda is likewise made, amounting to 300 lbs., of 1·090—1·095 spec. grav., which requires about 100 lbs. good crude Alicant or Teneriffe soda and from 45 to 50 lbs. caustic lime; the ley is prepared in the same manner, and from 45 to 48 lbs. of boracic acid added to it, upon which the ley is concentrated to about 180 to 185 lbs., or spec. grav. 1·175 to 1·180; in the mean time the froth is now and then removed, and finally the whole placed aside to crystallize. To the first mother-ley from 8 to 10 lbs. of boracic acid are added, and to the second residuous ley 2 or 3 lbs. more, frequently however, according to the substances employed, even as much as 10 lbs., which must be determined by a previous examination of the borax ley. The mode of operation is precisely the same as described in the preceding method; a greater quantity of sulphate of soda is however obtained on saturating the last mother-ley with sulphuric acid; the produce in crystallized borax amounts to from 80 to 90 lbs.

The third method relates to the preparation of the biborate of soda from the half-refined East Indian borax, which contains considerable quantities of smeary or fatty ingredients; it is washed with a caustic soda-ley of 1·370 to 1·380 spec. grav., and then, since it always contains a large excess of soda, it is gradually saturated with Tuscan boracic acid, as described in the previous methods, and purified by 3 to 4 recrystallizations. The produce may amount to 65, and in a favourable case to 75 per cent. crystallized borax.—*Ibid, from Archiv. der Pharm.*

ART. XXIX.—ON A NEW TEST FOR BILE AND SUGAR.

By Dr. M. Pettenkofer.

The phenomena about to be described, and of which an abstract was given in a former number of this Journal (vol. ii. p. 468,) were discovered by the author in studying the products of decomposition of the bile; the accuracy of this test depending upon several collateral circumstances relating to the purity of the reagents and use of proper proportions, we have deemed it necessary to notice these at greater length.

The author remarked that when ox-gall had been treated with sugar, and concentrated sulphuric acid was added until the precipitated choleic acid had begun to redissolve, the mixture became considerably heated, and the liquid assumed a deep violet tint, similar to that of hypermanganate of potash. It was at first considered that this remarkable alteration might depend upon the decomposition of the biliary colouring matter; but it was found equally to occur, nay even more evidently, with the bile which had been decolorized, and with pure biline obtained by Berzelius's method. All the attempts to separate the new product in an isolated state have hitherto completely failed. The author consequently confines his observations to the application of this phenomenon as a test (*a*) for bile (choleic acid,) and (*b*) for sugar. The following is the method of proceeding: A small quantity of the liquid supposed to contain the bile (if the substance be solid it must be treated with alcohol, and the solution evaporated) is poured into a test-tube, and two-thirds of the volume of sulphuric acid added by drops. The heat of the mixture must be kept below 144° Fahr., otherwise the choleic acid will be decomposed. From 2 to 5 drops of a solution of 1 part of cane-sugar to 4–5 of water are now added and the mixture shaken. If choleic acid be present, the violet-red colour will appear more or less distinctly according to the quantity present. The following precautions are however requisite to be attended to: 1st, the temperature must not exceed that mentioned to any extent, otherwise the colour, although formed, will be again destroyed; 2nd, the quantity of sugar must not be too large, because the colour of the sulphuric solution will become dark brown, and sulphurous acid will be formed whereby the violet-red colour may be concealed or destroyed; 3rd, the sulphuric acid must be free from sulphurous acid; 4th, if the fluid contain albumen, it is best to coagulate this previously, since albuminous solutions, although only when very concentrated and when heated with sugar and sulphuric acid, produce a similar colour. It could not be produced with mucous, nor with dilute albuminous solutions, which were always altered to a brown colour; 5th a great excess of chlorides, although such is rarely found in animal bodies, converted the colour to a brownish red; 6th, if the bile be in very small quantity, the fluid should be carefully concentrated on the water-bath, extracted with alcohol, this also evaporated to a small volume, and the test applied to the cold solution. Sometimes an interval of several minutes is required for the production of the colour, especially when the sulphuric acid is added very slowly, and conseqently a lower temperature is generated. In liquids, where the bile is in very small quantity, as in urine, secretions, &c., the author has found it requisite to make a spirituous extract, to evaporate this nearly to dryness on the water-bath, and then to transfer the moist residue into a watch-glass. When quite cold, sulphuric acid and a very small quantity of syrup are added, so that the temperature of the solution remains low. In the course of a few minutes, if the most minute trace of bile is present, the colour is produced. In this reaction, the grape-sugar starch, or in fact any substance which is convertible into grape-sugar by sulphuric acid, may be substituted for the cane-sugar. The same result was obtained with the bile of man, the fox, dog, ox, pig, fowl, frog and carp. The author concludes from this, that the bile of all the Vertebrata agrees chemically in containing choleic acid combined with soda.

By means of this test the author detected bile in the urine of a patient afflicted with pneumonia. The fæces of a healthy man, when extracted with spirit and treated as above, did not yield the slightest reaction, whilst on adding a little bile previously to the fæces it was perfectly developed. In the stools produced by calomel, several observers have remarked that the green or yellowish green colour is converted into red by treating them with mineral acids; by applying the sugar and acid, the same phenomena are produced. In all cases of diarrhœa, bile is found in the stools. The author imagines that the alterative effects of purgatives might be thus explained, by their carrying off the bile as fast as it is secreted, consequently preventing its absorption.

Concentrated muriatic acid heated with bile and sugar likewise produces a red colour, but this is much lighter and less beautiful than with sulphuric acid.

This test may also be adopted for the detection of sugar. If sugar be suspected in a liquid, urine for instance, an aqueous solution of ordinary ox-gall is gradually treated with sulphuric acid, until the precipitated choleic acid is again redissolved ; the suspected urine is then added, whereupon the violet-red colour is produced. As the quantity of sugar present is usually small, it is best previously to concentrate it. To detect bile in blood, the albumen is first separated by ebullition with spirit, and the concentrated fluid treated as above. If this test is used for sugar, the absence of starch must be previously proved by iodine.

The author thinks his test better than Trommer's in the examination of blood and urine, both because it acts more rapidly and delicately, and because its action is uninterrupted by the ammoniacal salts of the urine, the free ammonia of which retains the proto and peroxides of copper in solution until it is completely expelled by boiling, whereby the reduction of the oxide of copper may be readily effected by other substances. Pure manna and gall, when treated as above described, afford no trace of the peculiar reaction. It is thus easy to detect grape-sugar in manna.

Ibid, from Ann. der Chem. und Pharm.

ART. XXX.—ON PETTENKOFER'S NEW TEST FOR BILE.

By Dr. W. J. Griffith.

The test proposed by M. Pettenkofer is an exceedingly valuable one, and when applied in conjunction with that of the well-known reaction of acids on the colouring matter, will serve to supply what has hitherto been a desideratum, viz. a ready means of recognizing the peculiar biliary and the colouring matters in animal fluids. In a case of jaundice, which I had an opportunity of examining, the urine was of a golden-yellow colour, slightly albuminous, and not containing more than the ordinary proportion of other ingredients; on the addition of nitric acid, the green and red tints were well-marked, the former exceedingly intense; but on applying the sulphuric acid and syrup as recommended, and adopting the requisite precautions, not the slightest evidence of the presence of the choleic acid could be obtained, nor on analysis by the ordinary methods was I more successful; I therefore consider this a well-marked example (and I have since found another) wherein the biliary colouring matter only was separated with the urine. In examining a number of healthy urines, with a view to test the validity of this purple colour with the acid syrup, I was occasionally much perplexed by finding on the addition of the acid alone, that the urine assumed a reddish-purple colour, closely resembling the characteristic one, and the subsequent addition of the syrup produced no alteration, thus rendering the test apparently inapplicable. This alteration arises from the action of the acid on the colouring matter of the urine, and may always be distinguished from the true test-colour by allowing the mixture to repose; the choleic purple is permanent, whilst the other is gradually changed to a brown colour. The experimenter will find that where the bile is in very small quantity, a considerable excess of acid will frequently detect it when a smaller quantity will not; the syrup, however, must be added in very small quantity.—*Ibid.*

ART. XXXI.—ACETATE OF IRON AS A REMEDY FOR ARSENICAL PREPARATIONS.

The hydrated peroxide of iron is of admitted efficacy in cases of poisoning with uncombined arsenious or arsenic acid; but according to the experiments of Duflos, it is quite ineffectual when these acids are combined with bases, as, for example, Fowler's solution, or arsenite of potash, or arseniate of potash, which last is frequently employed in calico-printing, and is consequently easily procured.

In the uncertainty in which the practitioner may be placed as to whether the arsenical poisons be free or combined, it is very important to administer the oxide of iron in such a form as to produce a favourable result; to this end it is convenient to employ the peracetate of iron.

This compound may be prepared by adding to the hydrated peroxide of iron obtained from the decomposition of four parts of liquid perchloride of iron, three parts of acetic acid of density 1.06, and sufficient water to make up 16 parts.

This liquid, which is a solution of peracetate of iron with excess of base, precipitates arsenious and arsenic acid from all their solutions, either free, or combined with any base; 500 grains of it are sufficient to decompose 1880 grains of Fowler's solution.

This result demonstrates that liquid peracetate of iron merits preference in cases of poisoning by arsenical compounds. It should be remembered that its power is more rapid in proportion as it is more diluted with water; besides which, large dilution prevents all irritating action of the acetic acid set free.—*Journ. de Ch. Med.*, November 1844, as inserted in the *Philosophical Magazine.*

[The mode of preparing the above compound is not very clearly stated, for the strength of the liquid perchloride of iron is not given. It may be presumed that peracetate of iron mixed with peroxide is to be employed; the degree of excess of the latter is of little consequence, and the strength of the peracetate is limited by the employment of four parts of acetic acid of 1·06 made up to 16 parts with water, and this, it appears, is to be largely diluted before exhibition.—Ed. *Phil. Mag.*] *Ibid.*

ART. XXXII.—ON OFFICINAL SULPHUR PRÆCIPITATUM.

By Dr. Otto, of Brunswick.

The officinal precipitated sulphur varies much in external appearance; sometimes it is of a pure yellowish-white, sometimes of a more or less dirty grayish or even brownish-white. It could not be accounted for why the former colour was peculiar to the preparation obtained from the sulphuret of calcium, and the latter to that prepared from the ordinary sulphuret of potassium. From some experiments which have been made in my laboratory, it has resulted that the dirty-coloured appearance of the latter preparation is owing to certain impurities, especially to an amount of sulphuret of copper. Ordinary potash (always or nearly so) contains copper; this passes into the purified potash, and from this into the sulphuret of potassium, which, on saturation with acids, deposits sulphuret of copper. Carbonate of potash prepared from tartar yields a yellowish white *sulphur præcipitatum*, like the sulphuret of calcium. A preparation thrown down from ordinary sulphuret of potassium retains its dirty colour even when fused with pure carbonate of potash, and again precipitated with acids, but the dirty colour disappears immediately on pouring chlorine water on it (in the dry state, for when recently precipitated it is converted by it entirely into sulphuric acid,) and the copper may be detected without difficulty in the solution, and likewise in the residue left on incineration. If some pure carbonate of potash, prepared from tartar, be fused with surphur, with the addition of some oxide of copper, a sulphuret may be obtained, from which acids throw down a more or less brownish-white precipitate. Sulphuret of iron likewise appears to occur constantly in the preparation obtained from ordinary sulphuret of potassium. It appears therefore absolutely requisite that in future the sulphur præcipitatum be prepared solely from the sulphuret of calcium.—*Ibid, from Pharmaceut. Central Blatt.*

ART. XXXIII.—ON THE LIQUEFACTION AND SOLIDIFICATION OF GASEOUS BODIES. A Lecture delivered at the Royal Institution, by PROFESSOR FARADAY.

BEFORE commencing his lecture, the Professor read an extract from a letter written by Professor Liebig, of Giessen, shortly after his visit to this country, in which the learned writer said, the thing which struck him most in England was the persuasion that only those works that had a practical tendency attracted attention and commanded respect, whilst those which were purely scientific were almost unknown; and yet the latter were the true sources from which the others flowed. In Germany, added Liebig, it was the contrary; but he did not say that that was better—in his opinion the golden medium was the proper course. Mr. Faraday then proceeded with his lecture. The condensation of gases (said he) had been brought before the public some years ago. A gas was one of those substances in an aërial form which remained permanent under the ordinary circumstances of temperature and pressure, whilst vapor was like gas, but which under ordinary circumstances was condensable again into liquid. It was at one time thought that all gases were perfectly elastic fluids, but by his researches he had succeeded in turning into vapor the following nine gases, namely, chlorine, muriatic acid, sulphurous acid, sulphuretted hydrogen, carbonic acid, euchlorine, nitrous oxide, cyanogen, and ammonia. One of these, namely, carbonic acid, the late celebrated Thillorier, of Paris, had, after many experiments, obtained in a solid state, and Bunsen had subsequently obtained also cyanogen in a similar condition. But although continued attempts had been made to solidify the other seven, and by immersion in deep water a pressure of 200 atmospheres, *i. e.*, of 3,000lbs. to a square inch, had been produced, still they had been unattended with success. He would explain what he believed to be the reason of the failure. If he took a bottle half filled with ether (and this was Latour's experiment), and applied to it heat, the ether would rise in vapor, and so would continue until the vapor was much condensed. At last, the liquor below and the vapor above would be of as nearly the same weight as possible, and the least degree of additional heat would turn the liquor into vapor, or, if taken away, convert the vapor into liquor. Observe what happened. At that temperature of ether no pressure could bring the ether into a liquid state; at a lower temperature it would. He believed, then, the reason why so many had failed in liquefying and solidifying gases was, that although they could procure the immense pressure he had mentioned, they could not obtain a degree of temperature sufficiently low. He would explain in what manner he had succeeded. He had taken as his basis carbonic acid gas in its solid state as produced by Thillorier. A quantity of carbonic acid, in partly a liquid and partly a vapor state, being confined in a tube, the expansion of the vapor forced the liquid through an orifice in the side into a cylindrical brass box, and being acted on by a rapid current of air the liquid carbonic acid was immediately converted into a solid substance like snow. Its temperature in that state was 70° below 0 of Fahrenheit; but though he took that as his basis, it was not low enough for the purpose of his experiments. The temperature must, therefore, be further decreased. It had been demonstrated by Thillorier, that if ether were applied to solid carbonic acid, the temperature could be reduced to even 105° below Fahrenheit; but a lower degree was still required, and that was obtained by exhausting the air. His object, then, was to combine this extreme degree of cold with great pressure in his experiments on gases. The means by which he effected it he thus described:—A quantity of gas in a glass vessel was forced by a condensing pump into a tube inserted in the receiver of an air pump; that part of the tube inserted in the receiver was made of common bottle glass (the strongest kind for experiments, and capable of bearing an enormous pressure) in the shape of a retort, and the bent or lower part of the tube lying immersed in the cold bath (produced by solid carbonic acid combined with ether, after the air had been exhausted,) gas in a liquid, and by an increased degree of pressure, in a solid state, could be obtained. The learned professor illustrated the truth of the principle by producing olefiant gas in a liquid state, and observed that he had succeeded in obtaining in the same condition phosphoric hydrogen, by hydriodic acid, hydrobromic acid, fluoboron and fluosilicon; and in a solid form sulphurous acid, sulphuretted hydrogen, euchlorine, nitrous oxide, hydriodic acid, and hydrobromic acid. He had made carbonic acid the type of the others, but he thought that nitrous oxide would give a power of temperature as far below carbonic acid as that was below common ice. He saw no reason why the same result might not be obtained from oxygen, hydrogen, and nitrogen; and, in fact, he had hoped that evening to have shown oxygen in a liquefied state, but he had failed in his experiments, not because his principle was wrong, but from the porous, and hence imperfect, nature of the vessels used. With respect to hydrogen, he had had indications in the course of his experiments that it would be found to be a metal of a most subtile nature.—*Lond. Chemist.*

ART. XXXIV.—ON THE PREPARATION OF CITRIC AND TARTARIC ACIDS.

BY THE EDITOR OF "THE DUBLIN HOSPITAL GAZETTE."

In the preparation of citric and tartaric acids it is necessary to employ a precaution similar to that just described in the preparation of phosphate of soda. If cold lemon-juice be poured upon chalk, the carbonic acid liberated by the union of the citric acid with the lime, will not entirely escape, but will in part unite with a portion of the chalk, forming bicarbonate of lime, which will dissolve in the washings. Now, in this case, the inconvenience will result from the whole of the lime used not being present in the precipitate, for the quantity of dilute sulphuric acid used for the decomposition of the citrate of lime formed, is measured by the quantity of chalk employed. You are to use eight times the weight of dilute sulphuric acid, as of the carbonate of lime added to the lemon-juice, because it is calculated, that in this proportion there is just the amount of real acid necessary for saturating the earth. But if a part of the lime be carried off in the supernatant liquid, under the form of bicarbonate, it is evident that enough will not remain to neutralize the given quantity of sulphuric acid. So that when this acid has decomposed the citrate of lime, and freed the citric acid, the liquid which will dissolve the latter, will likewise contain a notable quantity of sulphuric acid, sufficient, upon evaporation, to char the crystals of citric acid, and render them discolored. It is necessary, therefore, for the success of this preparation, that the whole of the lime employed, should exist in the precipitate either as citrate, or carbonate, if an excess of the latter be used; to gain this end, all the carbonic acid liberated by the lemon-juice should be expelled, and to force its expulsion, the lemon-juice should be added to the chalk at a boiling temperature.

The necessity for the employment of a boiling heat is equally the case in the preparation of tartaric acid ; but the theory of its cause is so nearly identical that it is not necessary to describe it.

Mr. Philips, junior, has shown (see the first number of this Journal,) that this tendency of carbonic acid to form soluble super-salts is commonly the occasion of a considerable loss in the preparation of the saccharated carbonate of iron.

I may be permitted, in conclusion, to notice, that it is this property of carbonic acid which most probably influenced the compilers of our pharmacopœias to direct the solutions of sulphate of magnesia and carbonate of potash to be mixed boiling, in the manufacture of carbonate of magnesia. The *magnesia alba*, or carbonate of magnesia of commerce, is a sub-carbonate, consisting of a combination of neutral carbonate of magnesia and hydrate of magnesia ; the neutral carbonate of magnesia is a crystallisable salt, which may be frequently observed depositing in the bottles containing solutions of the super-carbonate introduced by Sir James Murray, and so much employed in pharmacy at present. This neutral carbonate is decomposed when put into water ; if the water be cold, it is decomposed into *magnesia alba* and bicarbonate ; if the water be boiling, it is resolved wholly into *magnesia alba*, or the sub-carbonate, the excess of carbonic acid being expelled.

Now, precisely a similar series of changes occur when solutions of sulphate of magnesia and carbonate of potash are mixed together. These neutral salts yield by double decomposition the materials for producing neutral salts. But the neutral carbonate of magnesia is decomposed by the water, and it depends on the temperature whether the whole of the magnesia be precipitated as a sub-carbonate, or a portion of it be washed away in the form of soluble bicarbonate.—*Ibid, from the Dublin Hospital Gazette.*

ART. XXXV.—REPORT ON THE MEMOIRS OF MM. SIMON AND HARDY RELATIVE TO THE CULTURE AND PRODUCTS OF THE PAPAVER SOMNIFERUM IN THE CLIMATE OF ALGIERS.

By MM. De Mirbel, Boussingault, and Payen (Reporter.)

MM. De Mirbel, Boussingault, and myself have been charged with the duty of reporting on Memoirs by MM. Hardy and Simon, relative to the culture and products of the *papaver somniferum* in the climate of Algiers; we now submit to the Academy the result of our investigation.

M. Hardy, in a very detailed memoir, gives an account of his new efforts to fulfil the intentions of M. C. Marechal, Minister of War, and to solve the question of the utility of the production of opium in Algiers.

With this view, the director of the central nursery, in continuing his experiments, proposed to cultivate a greater extent of land, in order better to ascertain the influence of seasons, of the period of sowing the seed, of agricultural care, &c.; wishing, also, to keep an account of the expenses and to deduct them from the value of the crop, M. Hardy thought, and rightly, that it was necessary to determine the quality of the products.

This latter part of the operations was more particularly reserved for us; consequently, and in order to complete the basis of the calculations, we at once present our experiments and observations in this respect.

One of the samples of opium, collected by M. Hardy, had been extracted during the rain; we analysed it separately. 100 parts contained 89·1 of dry substance, and gave 4·67 of pure morphia. In taking account of the excess of moisture in this sample, in order to compare the amount of morphia with the products sent over last year, it was found that 92·4 of dried substance should have furnished 4·84, a number which does not nearly approach that of 5·02 found in the opium of 1844.

The other sample, which represented the quality of the greater part of the crop, extracted during more favorable weather, contained 9·5 of water per cent., and gave 4·94 of morphia; by reducing its proportion of water to 7·6, in order to establish the comparison between the product of 1843, it is found that it represents 5·10 of pure morphia per cent., that is to say rather more than the opium in the foregoing crop.

Thus the opium obtained this time in a more extended culture is evidently superior in quality to the products examined last year.

This result, therefore, appears to confirm the hopes which we had conceived relative to the possibility of obtaining in Algiers opium of good and uniform quality.

The second important product of the same crop consists in the oil which is easily extracted from the seeds after the opium has been collected.

Profiting by the assistance of M. Tripier, director of the Pharmacy of Algiers, M. Hardy proved that the poppy seed gave 45 per cent. of oil, the greater part of which flowed out without heat and is comestible.

The seeds which have been sent to us gave 42.6 of oil, that is to say, 2·4 per cent. less than the quantity obtained by M. Tripier. Probably, the difference observed was owing to some alteration during the voyage. The sample of oil received from Algiers is like the oil of œilette, and slightly more coloured than those of the north of France.

The more extended culture made last year permitted the verification and completion of the instructions communicated in 1843, by the care of M. Liataud.

The following is a summary of the favorable conditions deduced from the latest observations. It requires a soft light substantial soil, particularly well permeable to water.

If it retained the latter, the root of the poppy, which is large, fleshy, and soft, would very soon be destroyed. The soils which appear preferable are those in which sand predominates nearly in the proportions of two-thirds to one-third of clay. This land should be amended the year before by transient manures, and prepared during the summer by deep digging, so as to render the earth as light as garden land.

It is also very useful for the plantation to be sheltered as much as possible from the west winds; the slightly inclined declivities which face the east, seem to present the most favorable exposure.

The seeds should be sown in the autumn; they appear immediately after the first rains. They are covered with leaves by a slow vegetation during the winter; and, in the spring, they give stems and capsules of a strength not to be obtained by seeds sown during or after the winter, forced as they are by conditions of climate as soon as those sown four or five months earlier.

It may happen in a rainy spring, like that of this year, for example, that these late-sown seeds may give very fine products, but this case is of rare occurrence.

The land should be divided into beds of 2 metres broad, with paths of 40 or 50 centimetres left free from the operations of weeding, gathering, &c.; the length of the bed is immaterial. From 2 kil. 500 grs. to 3 kil., may be sown in each hectare of land.

Sowing in a line does not answer for so fine a seed, because it is difficult to bury it at a proper depth; there are almost always vacant parts, the seeds which are too deep in the ground not being able to spring up.

As soon as the young plants have four or five leaves they should be freed from weeds, and the superfluous plants removed so as to leave a distance of 0.20 to 0.25 centimetres between each. The most vigorous plants should be preserved. Afterwards, when necessary, the ground is dug up a second time, and care is taken that no other plant grow in the plantation. When the young poppies completely cover the ground with their foliage, the binette must not be introduced any more, in order to avoid bruising the tender leaves. From this period until that of the maturity of the capsules, nothing is done to the plantation, except plucking up with the hand any weeds which may show themselves here and there, and of which the soil should always be carefully purged.

An important precaution to be taken during the operations of weeding, is not to wound the principal roots or the pivots, with the instruments made use of; otherwise the plant would perish by the decay produced by the effusion of its juices. The poppy will not bear transplanting; this means cannot therefore be employed for replenishing vacant places, as is the practice with some other cultures.

When it is perceived by their color turning yellow, and by the hardness produced by the accumulated juices, that the capsules have attained the proper maturity, the cultivator should hasten to put in requisition the workmen necessary for incising the capsules and collecting the opium; one hectare will require from 15 to 20 people for 12 or 15 days. Children should not be employed for this work; they cannot reach the capsules.

The product may be collected 20 hours after having incised the capsules, but this operation proceeds less quickly; by incising for three hours, the work of six or seven hours collecting is prepared. Thus the incising should be performed during the three hottest hours of the day, and the tears of opium which flowed out the night before collected during intervals of morning and evening.

The instrument which appears most suitable for making the incisions is a penknife with a convex blade; and, for collecting the opium, the blade of the carving-knife of the same form.

Taking account of the extraordinary and unfavorable variations of the temperature of this year, M. Hardy thus sets forth the culture of one hectare—

	Francs.
Labor with the hoe, 96 days at 2 francs,	192
Sowing, harrowing by hand, 44 days at 2 francs,	88
Twice digging,	118
Collecting opium, 229 days at 2 francs,	458
Total for opium,	856
Collecting seed, 37 days at 2 francs,	74
	930

PROBABLE PRODUCT OF ONE HECTARE.

By supposing one-third more for the produce of opium (for it must be admitted that the season will not be always so unfavorable as this year,) M. Hardy arrlved at the following results—

Opium, 13 killogrammes, 268 at 30 francs,	698
Poppy-seed, 11 hectolitres, at 30 francs,	330
690 bundles of stalks, at 10 centimes,	69
Total produce per hectare,	1097
Nett profit,	167

We have received from the Minister of War two samples of opium obtained from another culture by M. Simon, by means of peculiar processes. This opium was contained in poppy heads cut in two.

No. 1 lost by desiccation 8·5 per cent., and gave 3·70 of pure morphia, representing 3·74 for the opium reduced to the proportion of water taken as a term of comparison.

No. 2 contained 6·45 of water; 3·86 of morphia was obtained, a quantity equivalent to 3·82, for the normal degree of humidity.

These results, verified by twice repeating the analysis, prove that the quality of the opium extracted by M. Simon is rather inferior to that of the samples from Algiers, collected in 1843 and 1844.

The smaller proportions of morphia might, indeed, be compensated, or more than that, by the greater quantities of opium collected; but not having received any intelligence concerning the new processes employed, nor concerning the products obtained, we cannot form any opinion in this regard.

The examination of the memoir and sample sent by M. Hardy, and of which we have just given a report, shows that, notwithstanding exceptional and unfavorable circumstances of temperature, the quality of the opium is sustained and even improved; it is therefore permitted to us to hope that better results may yet be obtained in the ordinary conditions, by continuing with the same care these interesting agricultural experiments.

Everything leads us to believe that we may thus be able to obtain the important result of furnishing the medical art with an agent whose useful properties will be guaranteed by the uniformity of its composition.

The efforts to be made in order to obtain so high an object appear to us very worthy of being encouraged by the approbation of the Academy.—*London Chemist.*

ART. XXXVI.—ON THE HEAVY CALCINED MAGNESIA.

By M. J. Dalpias.

For half a century, Messrs. Henry, of Manchester, have prepared a heavy calcined magnesia; the consumption of which is immense, notwithstanding its very high price.

For a long time, these gentlemen alone possessed the secret of manufacturing this kind of magnesia; but for several years, two or three other English manufacturers appeared to have discovered their process. Thus, the heavy calcined magnesia of Mr. Howard of London, is perfectly similar to that of Henry's; its density is the same, it is at least five times higher than that of the ordinary calcined magnesia. Except Messrs. Henry, Howard, and two or three other manufacturers, there are, probably, very few persons in England who possess the secret of this preparation, and I think that M. Colas has rendered a true service to science by immediately making known the process which he has just discovered, and which consists in the following manipulation:—

A very firm paste is made by moistening powdered carbonate of magnesia. This paste should be well beaten, in order to employ as little water as possible; then it is dried in an oven, and it is calcined after having been pressed down in the crucible. It also contracts by calcination.

The crucible may also be filled with undried paste, and the whole put in the stove, in order to calcine it only after desiccation.

M. Colas has proved that it requires less time and heat to calcine magnesia, thus prepared, than for the calcination of ordinary magnesia. He has also proved that his heavy magnesia does not become hydrated, even after having been left for 24 hours in cold water. Those of Henry and Howard do not become more hydrated; it is likewise less soluble in the acids, and is much less apt to condense carbonic acid when exposed to the action of the air.

In 1811, M. Planché (Bulletin de Pharmacie, vol. iii., p. 511,) observed, that calcined magnesia might be obtained more or less dense, according as it is more or less strongly pressed before calcination; but, in order to obtain it very heavy, he recommends it to be kept maintained at a white heat for 6 or 8 hours.

More recently M. Durand published a process more similar to that of M. Colas.

This chemist expresses himself as follows—"Carbonate of magnesia is prepared with very pure sulphate of magnesia and carbonate of soda; before it is perfectly dry, it is strongly pressed in a mould in order to give it compactness; it is afterwards heated to whiteness for at least 6 or 8 hours."

From the foregoing, it would appear that M. Durand would consider it necessary to employ a recently prepared and still hydrated carbonate of magnesia; this alone renders his process very little practicable; and the white heat for 6 or 8 hours renders it very expensive.

M. Colas's process is, on the contrary, so convenient, since it admits of a quantity of magnesia being calcined at one time and with less fuel, that it is to be regretted that his product cannot be recommended for medical use; ordinary calcined magnesia, notwithstanding the inconvenience of its lightness, should always be preferred to it, since it is much more soluble in the acids, and in equal weight is certainly more active.

Before presenting M. Colas's product to the *Société de Pharmacie,* I thought it my duty to repeat his experiments, which I found very accurate. I will here add some of mine, which, notwithstanding their little importance, may be placed after his, for they were made in consequence of them.

In the first place, I do not think that M. Colas's process is exactly the same as that pursued by the English manufacturers, for their heavy magnesia is so fine and soft to the touch that it might almost be taken for talc. This property is precisely the only one which M. Colas's magnesia does not possess in so high a degree. That which leads me to think thus is, that in these same manufactories, a heavy carbonate of magnesia is prepared, whose density is nearly equal to Henrys' magnesia, and that this calcined carbonate gives a product equally heavy, and very soft to the touch.

The preparation of this carbonate is also a secret.

I will conclude this note with a few words on the light calcined magnesia, which comes from London, and whose very moderate price is the cause of its being universally met with, and that many pharmaciens are wrong in not calcining their own magnesia.

M. Mialhe (Journal de Pharmacie, June, 1844) finds that "this kind of magnesia contains little or no carbonic acid." For my own part, I have never met with English calcined magnesia of commerce which did not contain carbonic acid; on the contrary, a very appreciable quantity of it is always found, and it always effervesces with sulphuric acid diluted to one-eighth. With respect to the water which it contains, his observations and those of M. Dubail are too correct for me to add anything to them. I will only say to M. Mialhe, that I do not think, with him, that ordinary calcined magnesia attracts carbonic acid only when it is hydrated; I think that it attracts water and carbonic acid at the same time, and it was with the view of proving my assertion that I made the following experiment:—

Light caustic magnesia* was left for a month over mercury, and in an atmosphere of perfectly dried carbonic acid. Not the slightest absorption took place. I afterwards placed in the top of the bell-receiver a piece of ice wrapt in blotting-paper, in order that it might traverse the magnesia without wetting it. The carbonic acid was there gradually absorbed in so short a space of time, that, in this case, the magnesia could not have been hydrated before absorbing the gas. I think that the latter explains the presence of carbonic acid in the light calcined magnesia which comes to us from England; for, as M. Mialhe has wisely supposed, the English manufacturers are in the habit of exposing their calcined magnesia to the humid air, in order thus to obtain an increase of weight, varying between 15 and 20 per cent. I have several times repeated this experiment, and, contrary to the opinion of M. Mialhe, I have never succeeded in obtaining an hydroxide, but always a mixture of hydroxide and carbonate. An hydroxide with 1 atom of water may be directly obtained, provided that the magnesia be very caustic, and especially very light; if it possesses these two properties, it will be seen that, after having been wetted, by

---

* I give this name to the magnesia which we prepare in our laboratories to distinguish it from English magnesia.

desiccation in an oven, it will gradually lose its weight until it contains only 30 per cent. of water; then calcination alone can make it lose more.—*Ibid from Journ. de Pharm.*

ART. XXXVII.—ON THE CHEMICAL COMPOSITION OF GUANO.

Extract of a letter from M. E. MARCHAND, of Fécamp, to M. BOULLAY.

BEING entrusted with the revision, for a local journal, of an article on guano, and on its value as a manure, I examined this curious product myself, and I found, by analysis, that it is composed of—

Hippurate - -
Urate - - -
Phosphate - - } of ammonia.
Oxalate - - -
Hydro-chlorate -
Chloride of sodium.
Carbonate (?) -
Oxalate - - - } of lime.
Phosphate - -
Ammoniaco-magnesian phosphate.
Alumina, oxide of iron, and silica.
Indeterminate organic matter.

The existence of hippuric acid in this product is very remarkable; for, if guano be regarded, with M. Girardin, as coprolithes arising from antediluvian birds, or, with M. de Humboldt, as excrements and altered remains of birds which have inhabited, and still inhabit, the islands of the coast of Africa, it is no less true that the origin of hippuric acid, in this product, is difficult to be conceived, since none of the analyses of the excrements of birds which have hitherto been made and published have noticed this principle among its constituents.

Struck with these singular results, and supposing, besides, that hippuric acid might also be found in the excrements of birds with which we are more familiar, and that if skilful chemists have not met with it, it is probably owing to their not having looked for it, I am now undertaking a series of analyses of the *excrements of granivorous, piscivorous, and carnivorous birds*, being persuaded that investigations of this kind, properly directed, may give rise to physiological considerations and deductions of high importance.

When my experiments are completed, I will do myself the honor of communicating to you the results.—*Ibid from ibid.*

ART. XXXVIII.—ADULTERATION OF IODIDE OF POTASSIUM WITH CARBONATE OF POTASSA. Extract of a letter from M. DESTOUCHES to M. BOUDET.

M. RIVAUD, a distinguished pharmacien of Saumur, wishing to notice the adulteration (by voluntary fraud or ignorance) of a chemical product sent to him from Paris, has requested me to examine it simultaneously with himself; he has sent me a bottle, bearing the seal and address of M. Paton, pharmacien at Batignolles, and labelled *Iodide of Potassium.*

This iodide is amorphous, and run into plates after the manner of *cautery stone.* It is of a milky white; the taste is pungent and alkaline. It quickly restores to blue powerfully reddened litmus paper: it effervesces with the feeble acids; it does not contain chloride; the alteration is due to carbonate of potassa.

In order to determine the intrinsic value of this product, it was compared with pure iodide of potassium, procured from the firm of Robiquet and Co.

5·0 of Robiquet's iodide (No. 1) were dissolved in 100 grammes of distilled water.

5·0 of the doubtful iodide (No. 2) were likewise dissolved in 100 grammes of distilled water. This solution was slightly opalescent.

Both solutions were heated by a solution of acetate of lead, until cessation of precipitate. To No. 2, dilute nitric acid was added to remove the carbonate of lead formed, and in order to put the two precipitates in the same condition, nitric acid was likewise added to No. 1.

Both precipitates of iodide of lead were well washed with cold distilled water, and thrown on filters, dried and weighed. The following was the result obtained:—

No. 1 gave 6·62. No. 2, 5·18.
Thus—6·62 : 5·00 : : 5·18 : 3·91.

Or nearly 22 per cent. of carbonate of potassa, and only 78 of iodide of potassium, an enormous adulteration, and so much the more reprehensible as it is a medicine on which medical practitioners ought to be able to depend, and which is administered only in small doses.

The results obtained by M. Rivaud, by different means, are very nearly the same.

I beg you to be kind enough to insert this note in an early No. of the *Journal de Pharmacie.—Ibid from ibid.*

ART. XXXIX.—CHEMICAL PHENOMENA OF DIGESTION.

BY MESSRS. BERNARD AND BARRISWILL.

In a previous paper which we had the honor to submit to the judgment of the Academy, we experimentally proved that gastric juice is not limited merely to the dissolving of alimentary matters, but that it at the same time modifies them to an extreme degree, and thus prepares them for the ulterior phenomena of assimilation.

This first fact once established, we proposed to ourselves to study the special mode of action which gastric juice exercises upon the principal simple aliments. But before undertaking this study, it appeared to us indispensable to decide, definitely, upon the chemical constitution of the gastric juice, in the centre of which these transformations take place.

The constant acid reaction which gastric juice presents, constitutes one of its essential properties; it is known in fact, that gastric juice, neutralized by an alkali or an alkaline carbonate, loses entirely its digestive properties, which can always be restored by re-establishing its acid reaction. On another side we have acquired the certainty, that acidity is but one only of the elements of its activity—for, in exposing pure gastric juice to near the boiling temperature, it likewise loses its digestive properties, not from the absence of the acid re-action which remains the same, but by reason of your then acting upon another one of its principles which is essentially modified by heat.

After these two principal facts we admit, saving further demonstration, that gastric juice is indebted for the whole of its activity to the union of two principles inseparable in their action—viz.: 1st. A substance with an acid re-action, 2d. A peculiar organic matter destructible by heat. We merely give attention here to the cause of the acid re-action of the gastric juice. Two opinions in science prevail at the present day regarding the cause of this acidity: the one admits this property to be owing to the presence of biphosphate of lime; the other attributes it to an acid in a free state, existing in gastric juice. The principal fact relied upon for denying the existence of a free acid in gastric juice, and admitting alone the presence of biphosphate of lime, consists in the circumstance that gastric juice acted upon by an excess of carbonate of lime does not disengage carbonic acid. Experience has shown to us that this is occasioned by the excessive dilution of the acid in the gastric juice, which allows the carbonic acid produced to be dissolved as fast as it is formed. It was simply necessary for us to concentrate the gastric juice in order to obtain with chalk an evident effervescence. Moreover, we have observed that gastric juice dissolves neutral phosphate of lime, and, we are assured that this salt is completely insoluble in the biphosphate of the same base. From these experiments we have concluded that the acidity of gastric juice is due, not to biphosphate of lime, but to the presence of a free acid.

The authors who have asserted the presence of an isolated acid in gastric juice differ in opinion upon its nature; while some admit it to be acetic, the majority consider it hydrochloric acid, others again phosphoric acid, and some lactic acid.

We have in succession sought to prove these different acids to exist in gastric juice. Before indicating the steps we pursued in these experiments, we will observe that they were made with very pure gastric juice taken from different healthy dogs.

Acetic acid being volatile, we submitted the gastric juice to distillation at a mild heat, with the necessary precaution to avoid the rude jumping and mechanical passing over of the liquid; the first products collected and tried with litmus gave no acid reaction. As a counter-proof we distilled water, very faintly acidulated with vinegar: the first products of the distillation manifested an acid reaction. Gastric juice, to which we added a trace of acetic acid and even acetate of soda, behaved in the same manner by distillation. Having saturated gastric juice with carbonate of soda, then evaporated the solution to dryness and treated the residue with arsenious acid, we did not recognize the odour of oxide of cacodyle, which is, as is well known, so characteristic of acetic acid. From these experiments it seems to us proved that gastric juice does not contain any free acetic acid, neither does it any of the acetate.

Upon reflecting that the first products by distillation of gastric juice never give an acid liquid, we were tempted to avail ourselves of this fact, to reject also the presence of free hydrochloric acid, because according to the received notions, this acid which is volatile should have passed over in the first instance. We should, however, have committed an error, as will be seen by the following experiment: In fact, if you slightly acidulate water with hydrochloric acid and distill it, you will remark that nothing passes at first by distillation but pure water, whilst the acid which concentrates in the last products is only disengaged at the close of the operation. This unlooked for circumstance determined us upon distilling anew the pure gastric juice, and pushing the distillation to dryness. Here are the results: At first and nearly throughout the experiment, nothing passed but a limpid neutral liquid, affording no precipitate with nitrate of silver; afterwards nearly four-fifths of the juice having evaporated, a liquid sensibly acid is distilled, but furnishing no precipitate with the salts of silver. Lastly, near the termination, and when there remains but a few drops of gastric juice to evaporate, the liquid acid which is produced yields with salts of silver a precipitate so decided as not to be taken up by concentrated nitric acid. Beyond doubt this last product is hydrochloric acid, but it remains to be determined whether it exists in the gastric juice, or if under the circumstances of the operation it is not produced by the decomposition of a chloride. When you add to gastric juice, which as is known contains lime, a *minimum* proportion of oxalic acid, it is rendered turbid by the formation of an insoluble oxalate of lime, whilst a like quantity of the same reagent occasions no turbidness in water containing 2000ths of hydrochloric acid, to which chloride of calcium has been added.

This single experiment evidently shows that the hydrochloric acid exists in the form of a chloride, and is not found in a free state in gastric juice. We shall have further occasion to confirm this fact by other experiments.

Phosphoric acid being a fixed acid, we were required to seek it in the gastric juice, likewise concentrated by distillation; the residue had acquired an extremely acid reaction, and effervesced with chalk, but never entirely lost its acid reaction, notwithstanding the excess of chalky carbonate. This property, joined to those given it by different authors, indicated in a positive manner the presence of phosphoric acid in gastric juice. We afterwards saturated the juice with lime and oxide of zinc: the filtered liquors were neutral, and presented to us all the characters common to lime and zinc. This experiment proves that the phosphoric is not the only free acid of gastric juice, for had it been so, by reason of the insolubility of the two phosphates we should not have found either lime or zinc in the filtered liquid. We satisfied ourselves that such foreign principles as chloride of sodium disguise nothing of the re-action. To determine now the nature of the acid, which, existing in gastric juice, could give rise to soluble salts of lime and zinc, we should bear in mind that it is an acid passing only with the last products of distillation, and does not precipitate salts of silver.

Lactic acid exhibited to us similar characters; we submitted to distillation water acidulated with lactic acid, and discovered in this operation a striking analogy with the phenomena produced by the distillation of the gastric juice, namely—that in the first parts of the distillation, only pure water passes, but that towards the end an acid liquor, and that there remains a liquid residue strongly acid and effervescing with the carbonates. In distilling water acidulated with lactic acid, to which was added a small quantity of chloride of sodium, we obtained a still greater analogy, that is to say, we saw three distinct periods exhibited in the distillation, absolutely like that of the gastric juice: in the first, only pure water distilled over afterwards, an acid not precipitating salts of silver; and the last drops carried with them hydrochloric acid. This experiment nicely explains the presence of hydrochloric acid in the ulterior products of the distillation of gastric juice; this acid, in fact, proceeds from the decomposition of the chlorides by the lactic acid in the concentrated liquors. If this fact is not sufficient to prove that gastric juice contains no free hydrochloric acid, the following experiment will clear up all doubts in this respect—

If starch be boiled with hydrochloric acid, it soon loses its property of turning blue with iodine, whilst with lactic acid it undergoes no alteration even after prolonged boiling. On another side, if you boil starch with hydrochloric acid to which has been added a lactate soluble in excess, it will be observed that the fecula remains unchanged, as though lactic acid alone was the subject of the operation. This experiment plainly proves that hydrochloric acid cannot exist in presence of a lactic in excess. By similar evidence it may be proved that the existence of hydrochloric acid is inadmissible in the presence of a phosphate or an acetate in excess.

Taking up again these experiments, we see that lactic acid, and the acid of gastric juice, offer properties in common with each other: they are fixed by heat, carried along with the vapour of water in distillation, and disengage hydrochloric acid from the chlorides. Following up the comparison between the two acids, we have recognized in the acid of gastric juice all the characters pointed out by M. Pelouze for lactic acid; these two acids give in reality salts of lime, baryta, zinc, and copper soluble in water; a salt of copper which forms with lime a soluble double salt the colour of which is deeper than that of the simple; a salt of lime soluble in alcohol and precipitated from its alcoholic solution by ether. Upon the whole, from the characters enumerated, the existence of this acid appears to us, at present, incontestable. Mr. Chevreul and Messrs. Leuret and Lassaigne have already designated lactic acid in gastric juice.

Conclusions. From the preceding facts it may be asserted that the acid re-action of gastric juice is not owing to biphosphate of lime, but, on the contrary, results from an acid in a free state in the gastric fluid. We never could prove the existence of free hydrochloric and acetic acids as had been indicated. We have constantly found characters very distinct from lactic acid united to a feeble proportion of phosphoric acid.* According to us lactic acid should be considered as a constant physiological production of organism. Whatever in fact be the conditions of alimentation in which we place the animals, we have never seen the acid principle of gastric juice differ in its nature. So that after an exclusive vegetable or animal diet kept up for several days, or even after a prolonged diet, we have always found free lactic acid.

In asserting that lactic acid is the constant cause of the acidity of gastric juice, we do not wish to create the belief that this acid by its nature is endowed with certain special properties which render it indispensable to the action of the phenomena of digestion. On the contrary, it results from

---

* The phosphoric acid we signalize here, should be looked upon as a secondary product of a re-action of lactic acid upon the phosphate contained in the gastric juice.

the experiments of Mr. Blondlot and those of our own, that if an acid re-action is indispensable to the manifestations of the dissolving property of gastric juice, the nature of the acid producing this re-action is indifferent.

It is thus we have been able to saturate gastric juice with neutral phosphate of lime, or add to it acetic or phosphoric acid in large excess, and even hydrochloric acid *in sufficient quantity to make it really in a free state*, in the liquid, and the gastric juice always preserved its digestive properties. This equivalence of the acids for the activity of the gastric juice appears even necessary : for at each instant, from the fact of alimentation, the most different salts are introduced into the stomach at the moment of the formation of gastric juice.

We are all made to understand, then, that if among these salts any be found of which the acid may be displaced by lactic acid, the digestive functions will be infallibly disturbed, if the new acid set at liberty could not replace the normal acid.—*Journal de Pharmacie.*

A. D.

ART. XL.—ON THE PREPARATION OF PHOSPHATE OF SODA.

BY THE EDITOR OF "THE DUBLIN HOSPITAL GAZETTE."

PHOSPHATE of soda is prepared, according to the directions of the "Dublin Pharmacopœia," by forming a soluble super-phosphate of lime by the action of sulphuric acid on bones burnt to whiteness, and decomposing this super-phosphate by means of carbonate of soda; the excess of phosphoric acid unites with the soda forming phosphate of soda which dissolves, while insoluble phosphate of lime is thrown down, and carbonic acid is given off with effervescence.

Now, I have observed, that when the solutions of super-phosphate of lime and carbonate of soda are mixed cold, and the mixture filtered for the purpose of separating the precipitated phosphate of lime, the liquid, when poured into a Wedgewood dish, and placed in a sand-bath, becomes turbid as it grows warm, and the effervescence at the same time becomes renewed; these phenomena continue until the solution attains a boiling temperature, so that it is necessary to refilter before crystallisation is permitted to take place.

The explanation of these facts is as follows:—when the excess of phosphoric acid decomposes the carbonate of soda, the carbonic acid liberated does not all escape, but some of it unites with a moiety of the lime, forming bi-carbonate of lime, liberating phosphoric acid which combines with the undecomposed phosphate of lime regenerating the super-salt. Now, both the bi-carbonate of lime, and super-phosphate of lime are soluble, so that when the solutions are mixed in the cold, the whole of the carbonic acid does not escape, nor does the whole of the phosphate of lime precipitate. A precisely similar reaction takes place when a stream of carbonic acid gas is passed through water holding phosphate of lime in suspension; the carbonic acid gradually dissolves the phosphate of lime. When this solution is boiled, the carbonic acid is driven off, the lime it was combined with reunites to the excess of phosphoric acid in the super-salt, and insoluble phosphate of lime is again formed. This is the reason why the mixed and filtered solutions of super-phosphate of lime and carbonate of soda become turbid and effervesce upon the application of heat; phosphate of lime precipitating upon the escape of the carbonic acid which held it in solution.

To avoid the inconvenience, therefore, of being forced to refilter the liquid, it is necessary, in the preparation of phosphate of soda, to mix the solutions of super-phosphate of lime and carbonate of soda boiling, when the whole of the carbonic acid will escape, and the entire of the phosphate of lime will become precipitated.—*From the Dublin Hospital Gazette.*

ART. XLI.—ON CEYLON MOSS.

BY M. SCHACHT, OF BERLIN.

For some time there has existed in commerce a lichen known under the name of Ceylon moss, which is employed in the same cases as carrageen.

This lichen is the *fucus lichenoïdes,* or *sphærococcus.*

In order to ascertain the advantage to be derived from the employment of this moss for the preparation of a jelly, M. Schacht has made some experiments on the new plant, on carrageen, and on Iceland moss; and it results that, to obtain 100 grammes of jelly of the same consistence, it is necessary to employ 24 grammes of Iceland moss, 4 of carrageen, and 6 of Ceylon moss. The latter is less mucilaginous than carrageen, but it has the advantage over it of furnishing a less colored jelly.

A German physician, Dr. Liegmund, has maintained, that this moss does not contain iodine, but the presence of this principle in it is easily demonstrated. For this purpose, this moss is incinerated, the residue is treated several times by hot water, the united liquids are evaporated to dryness. The solid mass obtained with alcohol is agitated; and evaporated. The solid product is placed in a glass tube, a few drops of concentrated sulphuric acid are poured on, it is closed with a starched paper, heated, and the blue tint of iodine is very soon manifested.

By redissolving, in distilled water, the product of the evaporation of the alcoholic solution, and by precipitating it by nitrate of silver, the proportion of iodine may be determined.

In Ceylon moss, it is about 0 grammes 000·460; in carrageen, about 0 grammes 000·570; so that this last species contains more iodine than the former.—*Ibid from Journ. de Pharmacie.*

ART. XLII.—PROCEEDINGS OF THE NEW YORK COLLEGE OF PHARMACY.

At a Stated Meeting of the College of Pharmacy of the City of New York, held June 19th, 1845,

Upon reading the Minutes of the Board of Trustees, the attention of the College was called to the correspondence between Mr. Wm. Bailey and the President: whereupon it was, on motion,

Resolved, That copies of the correspondence between Mr. Wm. Bailey, of Wolverhampton, and the President, relative to the Blue Pill Mass, together with a sketch of the mode of its analysis, furnished by Professor Reid, be forwarded to the publishers of the American Journal of Pharmacy, with permission to publish the same if they deem proper.

Wolverhampton, 18th April, 1845.

Sir,—I have the honor to acknowledge the receipt, per "Cambria" steamer, of a copy of a resolution of the College of Pharmacy of the City of New York, passed at its stated meeting, held on the 20th ult., relative to a specimen of Blue Mass handed to you by Mr. Aspinwall, stated to have been imported by Messrs. Cumming, Main & Co.—said to have been prepared by me, and supposed to contain 25 per cent. of mercury. I feel obliged, by your courtesy and justice, in apprising me of it. In reply, I beg to state for the information of your committee, firstly, that I never sold any to that house; and secondly, that I do not consider myself responsible for any Pharmaceutical Preparation, or Chemical, except those which bear my stamp, (one of which I enclose for your inspection;) and any article said to be mine, not having such stamp attached, you may consider fictitious and an imposition.

I also beg to inform you, that every preparation sent out from my Laboratory is invariably manufactured according to the formula of the London Pharmacopœia, and warranted as such, unless expressly ordered to the contrary. It may not be out of place to mention, that a valued friend of mine, who arrived in England from Philadelphia a few days ago, assured me, personally, that my Chemicals and Pharmaceuticals were more esteemed in your country than those of any other manufacturer.

If you think proper, I will, with pleasure, send to you direct, specimens of all or of any of the products of my Laboratory for your examination and report thereon. Waiting your instructions, believe me, with distinguished consideration, to remain

Yours, very respectfully,
W. Bailey.

To Constantine Adamson, Esq.
Presd't of College of Pharmacy, New York.

New York, June 11th, 1845.

Sir,—In reply to your favor of 18th April, I beg leave to say, that it arrived on the day after the stated meeting of the Board of Trustees in May, and consequently could not be submitted until Thursday of last week, the next stated meeting, when the following resolution was passed. "That the President be requested to communicate to Mess. Cumming, Main & Co. the contents of Mr. W. Bailey's letter, and then reply to him as he may judge proper." In conforming with this resolution, I waited upon the gentlemen above mentioned, and received from Mr. Cumming the assurance that the Blue Pill Mass in question did most certainly come from you, being purchased by their house in London, whose firm was Riach, Cumming & Co., and is now Riach, Main & Co.; and that the fact of it being intended for exportation to New York could scarcely, with any chance of probability, be unknown to you; moreover, that it was not ordered of any particular strength; that you were written to, by their London house, inquiring at what price you could furnish a certain quantity of Blue Pill Mass; and that, in consequence of your offer, it was ordered from you, under the supposition that it was of the usual strength. As the College of Pharmacy considers itself in some measure the guardian of the public health, some further remarks appear to be requisite. It was the opinion of several members of the Board, that the apparent attempt to shelter yourself under the excuse that it did not bear your label or stamp, is but little in your favor; for although you proceed to say that everything bearing that distinction "is invariably manufactured according to the formula of the London Pharmacopœia," you do not deny that you manufacture articles, "when expressly ordered," which may vary very much from that standard, and which may be sent abroad, as in the present instance, reckless on your part who may be imposed upon, or how much the recovery of a patient may be retarded, so long as you, by a slight reduction in price, succeed in obtaining an order from an exporting house, whose knowledge on such subjects must necessarily be very limited. We trust you will readily discover that, whatever may be the reports of your friends or agents doing business on this side of the Atlantic, your true interest will be best insured by never suffering an article to pass your gates, the quality of which (although it does not bear your label,) can be called in question; and we do not hesitate to add, that the preparation of chemicals of insufficient quality is no less beneath the dignity, than prejudicial to the interests of a manufacturer of reputation; and where the article is of such vital importance, as in the present case, it is not only reprehensible, but absolutely criminal.

Your labels, be assured, will be carefully preserved by the College of Pharmacy of New York; and the preparations which bear them, as well as such as you send here for sale, as the specimens your kindness may send the College for examination, shall be carefully tested, and their respective qualities, without prejudice or favor, be made known; for already some bearing that warrantee have appeared in this market, which did not come up to the standard to which you lay claim—I allude to Oxyd of Zinc (which, in the hands of one of our members, exhibited a strong effervescence when submitted to the action of a diluted acid,) and Precipitated Chalk, whose decided saline taste at once disclosed the imperfection of its preparation.

We have hitherto been in the habit of sending to England, in confident expectation of invariably obtaining there the most perfect preparations; and we sincerely hope, that not only you, but every other chemical manufacturer in that country, will avoid affording us any inducements for repeating similar remarks. Having herein expressed to you the decided opinion of the Board of Trustees of the College of Pharmacy,

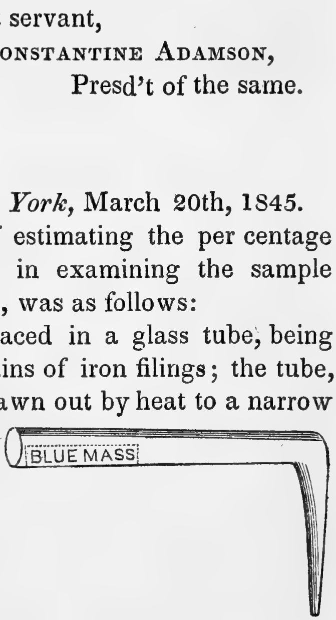
I remain, Sir,
Your obed't servant,
CONSTANTINE ADAMSON,
Presd't of the same.

To Mr. W. Bailey, Chemist,
Wolverhampton, England.

New York, March 20th, 1845.

DEAR SIR,—The method of estimating the per centage of mercury, which I adopted in examining the sample lately for J. S. Aspinwall, Esq., was as follows:

Twenty-five grains were placed in a glass tube, being first mixed with about five grains of iron filings; the tube, which was green glass, was drawn out by heat to a narrow bore, and then bent in this form. This drawing represents the tube, with the blue pill mass in it, and the space it occupied in the tube. Heat was gently applied, and gradually increased by the flame of a spirit lamp, aided by a



blowpipe. The distilled mercury and results of the decomposition of the organic matters were passed into a small cup of alcohol; the tube was broken when cool, and all the volatilized matter mixed with the alcohol; this was diluted with about one ounce of water, and boiled with a solution of Proto-chloride of Tin in excess. The precipitate washed, and sublimed in a tube, gave the metallic mercury. The object of the iron is to decompose any sulphuret of mercury that might be formed. The alcohol decomposes, or rather holds in solution, the organic matter separated during the distillation, so that the mercury can subside. The proto-chloride of tin precipitates any mercury which might be dissolved by the formation of acetic acid during the destructive distillation of the organic matter.

Yours, very respectfully,
LAWRENCE REID.

To C. Adamson, Esq.,
Chairman Com. of Inspection,
Col. of Pharmacy, N. Y.

By order,
JOHN MEAKIM, Secretary.

MISCELLANY.

On a new Bleaching Principle produced by the slow Combustion of Æther in Atmospheric Air, and by the rapid Combustion of Bodies in a Jet of Hydrogen Gas. By C. F. Schœnbein, Professor of Chemistry in the University of Basle, &c. Communicated in a letter to Michael Faraday, Esq., F. R. S., &c.—The author, having observed that a peculiar principle, in many respects similar to chlorine, was developed during the slow combustion of phosphorus in the atmosphere, was led to inquire into the product of the slow combustion of the vapour of æther mixed with atmospheric air. He finds that, besides well-known compounds, such as aldehydic, formic and acetic acids, there is evolved a principle hitherto unnoticed, which possesses oxodizing and bleaching properties in an eminent degree. It decomposes indigo, iodide of potassium, and hydriodic acid, and also, though more slowly, bromide of potassium. When in contact with water, it converts iodine into iodic acid, and sulphurous into sulphuric acid, changes the yellow ferro-cyanide of potassium into the red, and the white cyanide of iron into the blue; it transforms the salts of protoxide of iron into those of the peroxide; and it discharges the colours produced by sulphuret of lead. The author points out the similarity between the action of this substance, in these instances, and that of chlorine and of ozone.

Analogous results were obtained from the combustion of a jet of hydrogen gas in atmospheric air, and even, under particular circumstances, from the flame of a common candle, and also from various other inflammable bodies when burning under certain conditions. The author is hence led to the conclusion that this peculiar oxidizing and bleaching principle is produced in all cases of rapid combustion taking place in atmospheric air, and that its production is therefore independent of the nature of the substance which is burnt.—*Chem. Gaz.*

Observations on Euphorbia Esula and E. Cyparissias.—M. Stickel draws attention to the fact, that the above widely distributed plants contain a considerable quantity of a yellow, very beautiful colouring substance, which may be precipitated from the decoction prepared with water containing alum, by basic acetate of lead or protochloride of tin. Æther extracts from these plants a tolerable quantity of caoutchouc;

alcohol then yields a tincture, from which, on long standing, a white, crystalline, highly volatile camphor-like substance, with a burning taste, is deposited. The liquid separated from this, yields, on evaporation, a dark green resin, which has a burning taste, gradually hardens by exposure to the air, and greatly resembles euphorbium; the author also found gallic acid.—*Ibid, from Archiv. der Pharm.*

Notice respecting Veratrine.—According to M. Versmann, the veratrine of commerce frequently contains lime, resulting from the employment of lime in its preparation. A small quantity of lime, moreover, facilitates the drying, and renders the preparation more beautiful. It is easily detected on incineration, and is best removed by dissolving the veratrine in spirit, precipitating with sulphuric acid, filtration, driving off the alcohol, and precipitating the veratrine with ammonia.—*Ibid, from Buchn. Rept.*

Observations on Creosote. By M. DEVILLE.—According to the author, the following rule may be applied to several of the resins, viz: that on their destructive distillation they yield the same oil (or at least one isomeric) as that from which they originated. The body formed on the distillation of guaiacum resin, $C^{14} H^{16} O^4$, called by the author hydruret of guaiacyle, resembles in every respect creosote ($C^{14} H^{16} O^2$), and may be considered as its oxide. Creosote colours salts of iron blue, guaiacum oil colours them brown; both give with bromine crystalline compounds in which substitution occurs. Creosote may be regarded as the alcohol of the benzoyle series; both yield, when treated with sulphuric acid and chromate of potash, a peculiar salt of chrome; neither of them become coloured by exposure to the air if in the *pure* state. Creosote would therefore range in the class of essential oils which are regenerated by distillation; and this would explain why it is not obtained from all woods, and likewise why it appears to have a different composition according to its origin.—*Ibid, from Ann. der Chim. et der Phys.*

An Account of the artificial formation of a Vegeto-alkali. By GEORGE FOWNES, Esq.—The substance which is the subject of investigation in this paper, is a volatile oil, obtained by distillation from a mixture of bran, sulphuric acid and water, and is designated by the author by the name of *furfurol.* Its chemical composition is expressed by the formula $C^{15} H^6 O^6$, and its properties are the following:—When free from water and freshly rectified, it is nearly colourless; but after a few hours, it acquires a brownish tint, which eventually deepens almost to blackness. When in contact with water, or when not properly rendered anhydrous, it is less subject to change, and merely assumes a yellow colour. Its odour resembles that of a mixture of bitter almond oil and oil of cassia, but has less fragrance. Its specific gravity at 60° Fahr., is 1.168; it boils at 323° Fahr., and distils at that temperature without alteration. It dissolves to a large extent in cold water, and also in alcohol. Its solution in concentrated sulphuric acid has a magnificent purple colour, and is decomposed by water. Nitric acid, with the aid of heat, attacks the oil with prodigious violence, evolving copious red fumes, and generating oxalic acid, which appears to be the only product. It dissolves in a solution of caustic potash, forming a deep brown liquid, from which ashes precipitate a resinous matter. With a slight heat, it explodes when acted upon by metallic potassium.

When placed in contact with 5 or 6 times its bulk of *Liquor ammoniæ*, it is gradually converted into a solid, yellowish-white, and somewhat crystalline mass, which is very bulky, perfectly soluble in cold water, and easily obtained in a state of dryness under a vacuum. The formula expressing the chemical constitution of this substance, or of *furfuroamide*, as the author calls it, is $C^{15} H^{6} N O^{3}$, and it is classed by him with the *amides*. The oil itself appears to be identical with the substance described by Dr. Stenhouse under the name of *artificial oil of ants*. Another substance, isomeric with the amides, and of which the formula is $C^{30} H^{12} N^{2} O^{6}$, was obtained by the author, and termed by him *furfurine*, and found to have the properties of a vegeto-alkali, and to form saline compounds with various acids.—*Ibid.*

On the Adulteration of the Sulphate of Quinine. By M. Pelletier.—The sulphate of quinine is easily adulterated with salicine, although it does not crystallize in the same form. When the sulphate of quinine is mixed with one-half or only one-fourth of salicine, the reaction of concentrated sulphuric acid is sufficiently decisive to enable one to conclude as to the sophistication; but if there be but one-tenth in the mixture, the sulphuric acid does not acquire the bright red colour which characterizes pure salicine; in this case the liquid resembles sulphuric acid coloured by some particles of carbonized vegetable matter. To be able to pronounce positively, it is therefore requisite to isolate the salicine, and to obtain the above reaction in all its force.

I added 12 decigrms. of concentrated sulphuric acid to 2 decigrms. of sulphate of quinine sophisticated with one-tenth of salicine; the salt was dissolved and coloured brown. I then added 25 grms. of distilled water, when the brown colour disappeared, and the salicine remained white and suspended in the liquid. The salicine is not dissolved by this acid solution of sulphate of quinine. I then filtered and collected on a watch-glass a very bitter white powder, which gave the bright red reaction with cold concentrated sulphuric acid.

If from 50 to 60 grms. of water be added, the liquid remains opake, apparently without any precipitate resulting; but after some time, one is observed to form with the gelatinous appearance of a precipitate of hydrate of alumina, which it is far more difficult to collect. It is consequently important to add the water in small portions, and to cease when it is seen that the precipitate separates with facility.—*Ibid, from Journ. Chim. Med.*

On the Purification of Commercial Nitric Acid. By M. C. Barreswil.—Commercial nitric acid almost always contains hydrochloric acid, which it is frequently important to separate. The usual method for effecting this, consists in adding a slight excess of nitrate of silver to the nitric acid, and distilling. However convenient this process may be, it is always employed with regret; for although the loss in silver is theoretically naught, it practically amounts to a pretty considerable quantity in a laboratory in which much pure acid is employed. For this reason I thought it might be useful to indicate a very simple method for obtaining pure nitric acid without the employment of nitrate of silver. It consists in distilling the commercial acid, and setting aside the first portions, amounting to from one-fourth to one-eighth, according to the quality of the acid employed. This first product is very impure, and may be turned into nitro-muriatic acid; that which passes over subsequently is absolutely pure.—*Ibid, from Journ. de Pharm.*

On a means of detecting Quinic Acid. By John Stenhouse, Ph. D.—As it is a point of considerable importance to be able to distinguish the true Cinchona barks from the spurious, Dr. Stenhouse offers, in the present communication, a means of effecting this through the medium of the quinic acid, which is always present in the genuine Cinchonas. The process proposed consists in converting the acid into quinone by means of sulphuric acid and peroxide of manganese, and submitting the mixture to distillation, when the quinone, with its strongly-marked characteristic properties, passes over. Less than ¼ oz. of the sample of bark is sufficient for the trial. In operating on spurious barks, the alburnum of the *Pinus sylvestris*, the latter being stated, on the authority of Berzelius, to contain a ½ per cent. of quinate of lime, and also in cases when quinic acid is said to be associated with gallic acid,—the author could not trace its presence, even when operating on 1½ lb. of the material, although on adding 2 grs. of quinate of lime, the quinone was immediately traceable. The author also states that the presence of an alkaloid may be readily detected by macerating the bark in dilute sulphuric acid, treating the precipitate thrown down by carbonate of soda with caustic soda or potash, and distilling; quinoiline will pass over, which is easily recognised by its peculiar characters and properties. The exact nature of the alkaloid is to be subsequently ascertained.—*Ibid.*

Remarks upon Chloranil. By Dr. Augustus William Hofmann, Assistant in the Giessen Laboratory.—Chloranil was first obtained by Erdmann, when studying the action of chlorine upon indigo. He represents it by the formula $C^6\ Cl^2\ O^2$. Laurent considers that its equivalent should be $C^{12}\ Cl^4\ O^4$.

Erdmann obtained chloranil by passing a stream of chlorine through an alcoholic solution of chlorisatine or bichlorisatine; but this process is circuitous, and yields very little chloranil, other products resulting, and in larger quantity. Fritzsche formed chloranil by the continued action of chlorate of potash and hydrochloric acid upon aniline. Dr. Hofmann confirmed his statements, and observing the relation between the aniline and the phenyle series, endeavored to obtain chloranil from the latter group of bodies, and with success, chloranil being often formed as one of the last results of decomposition of organic substances under the united influence of chlorine and oxygen. By means of hydrochloric acid and chlorate of potash, Dr. Hofmann first obtained chloranil from hydrate of phenyle; and he found an aqueous solution, or a watery extract of coal-gas naphtha, which contains both aniline and hydrate of phenyle, preferable to a solution in alcohol.

To purify chloranil, it must be washed with water and crystallized from alcohol. Alcohol dissolves it when hot, and deposits it on cooling; it is more soluble in hot æther, but separates from either of these solvents in golden-yellow scales; volatile at 302° F., but subliming completely at 410° to 428° F. The identity of the substance obtained from the hydrate of phenyle with Erdmann's chloranil, was proved by the results of several analyses.

In the action of hydrochloric acid and chlorate of potash upon hydrate of phenyle, other substances are formed before chloranil. On interrupting the decomposition, and examining these bodies, they proved to be chlorophenussic and chlorophenissic acids. These acids are convertible into chloranil. Moreover, Laurent's nitrophenessic and nitrophenissic (carbazotic) acids are in the same way converted into chloranil.

Chrysolepinic acid of Schunck is also transformed into chloranil by the same agency; and it was found that several bodies in the salicyle series, as salicylous acid, salicylic acid and nitrosalicylic acid (indigotic acid or anilic acid), under the influence of hydrochloric acid and chlorate of potash, decompose and yield chloranil.

Benzoic acid, although identical in composition with salicylous acid, does not yield chloranil; nor do nitrobenzoic acid, benzine, nitrobenzide, binitrobenzide or hydruret of benzyle.

Salicine (the basis of the salicyle series), being soluble in water, seems to be the fittest substance for yielding large quantities of chloranil. Salicine and chlorate of potash must be dissolved in boiling water, and small quantities of hydrochloric acid added at intervals; one of the results of the ensuing decomposition is chloranil.

In conclusion, Dr. Hofmann calls the attention of chemists to the chlorate of potash as an oxidizing agent applicable to organic chemistry; he has heated *quinone* with it and hydrochloric acid, and found it readily convertible into chloranil. Dr. Hofmann proposes to pursue the subject, and to trace the relations of quinone and aniline.—*Ibid.*

On some Specimens of the Green Glass of Commerce. By Robert Warington, Esq.—The principal subject of this communication was a green glass which has lately appeared as an article of commerce, in the form of wine bottles. These are offered to the consumer, the wine merchant, at a lower price, and with the tempting recommendation that they will cause port wine to deposit its crust sooner and firmer than the bottles usually employed. On examination, this property was found to arise from an excess of lime having been used in its manufacture, which had rendered the glass, to a certain extent, soluble in weak acids.—Dilute sulphuric acid acted to such an extent as to form a crystalline deposit of sulphate of lime in the interior, of a quarter of an inch in thickness, and this, in its crystallization, had burst the bottles in all directions.—*Ibid.*

Arseniate of Quinine.—M. Bourieres, has lately made known a new salt, the arseniate of quinine, which he proposes to substitute for arsenious acid, the latter being threatened with final proscription, on account of the dangers which may result from its use. He obtained this salt directly by treating pure quinine with arsenic acid. This latter body being more soluble in water, and producing more neutral salts than arsenious acid, and which are better crystallized, he has given it the preference. M. Bourieres hopes that this new compound will possess the well-proved efficacy of arsenic in obstinate intermittent fevers, presenting the advantage of being exclusively reserved for medical use, which will prevent all danger. Without pretending that the small quantity of quinine which enters into combination in the arseniate of this base performs a great part in the action of the medicine, he still does not think that its presence is entirely useless; and, in endeavoring to form with arsenic a new salt possessing febrifuge properties, he was naturally led to the employment of quinine.—*Lond. Chemist, from Journ. de Chim. Med.*

On the distilled Waters of the Pharmacopœia. By Robert Warington, Esq.—This paper consists of an examination of the medicated waters of the Pharmacopœias of this country, prepared either by distillation or through the medium of carbonate of magnesia, and was commenced in consequence of a fact noticed by the author, that water containing a very small quantity of spirit became acid by long exposure to the air. On experiment it was found that many of the distilled waters underwent the same change, and evidently from the small quantity of spirit ordered to be introduced, as other portions of the same waters, to which no spirit had been added, did not in any case undergo this change. Many of the foreign Pharmacopœias also direct the simple distillation of the material with water without any spirit. In the instances where carbonate of magnesia is employed, the author proves that its action is only mechanical, to subdivide the oily particles, and thus expose a greatly extended surface to the solvent action of the water. It is also shown experimentally, that of all substances carbonate of magnesia is about the worst that can be employed; and this arises not from its forming soluble compounds with the oily acids, as is generally supposed, but from its being dissolved to an injurious extent in the distilled water employed: he therefore proposes the substitution of the Cornish porcelain clay, finely powdered silica, glass or pumice stone, as a medium for the mechanical subdivision of the essential oil.—*London Chem. Gaz.*

On Musk in Emulsions. By Dr. Hauln, of Lahr.—We have found in one of the last numbers of the *Archives of Pharmacy*, of Hanover, a note from Dr. Hauln, relative to a point in practical Pharmacy to which attention has already been called, but which may be, with utility, repeated here. It relates to the nearly complete disappearance of the odor of musk in preparations where this substance is associated, either with syrup of almonds or cherry laurel water. The knowledge of this peculiarity is important, especially to physicians, who without a cognizance of this fact will be led to the impression that the quantity of musk directed in a prescription had not been introduced.

This fact was noticed, as we have said, for the first time by M. Hauln; since then by M. Soubeiran, and more recently yet by M. Fauré, of Bordeaux. The last has been conducted on this subject to some interesting observations. He has ascertained that almond syrup only marks the odor of musk when it contains *bitter* almonds. The milk of sweet almonds does not possess this property. Cherry laurel water, on the contrary, possesses it in a degree at least equal to bitter almonds. It is therefore simply the hydrocyanic acid which disguises the odor of the musk, by reason of its lively and penetrating odor, which, however, is less subtle than that of musk. And, in fact, if one swallows a spoonful of the mixture of musk in orgeat syrup or cherry laurel water, neither the odor or taste of the musk are at first appreciable; but in proportion as the odor and taste of the hydrocyanic acid disappears from the mouth, those of the musk are developed, and persist as long a time as if the dose had not been mixed in orgeat syrup or cherry laurel water.

At the time when M. Fauré published his observations, he remarked that it remained to be ascertained whether the action of hydrocyanic acid on musk, modified or not its medicinal properties, either during the influence that the acid exercises, or after it was dissipated. No experiments that we know of have been made since then on this subject.

Ointment to aid the growth of Hair. By J. KALLHOFERT.—Though I consider the formula of an ointment communicated in Buchner's *Repertorium*, vol. 34, No. 2, by Mr. Steege, apothecary to the court, to be far better than the following, which is my own, I think I ought to make it known, as several eminent physicians, especially my friend, Dr. Sedelbauer, and myself, have found it highly efficient; individuals who had lost almost all their hair, by the use of this ointment preserved the few remaining, and promoted the growth of new ones.

Unguentum contra Alopeciam.

℞ Extracti Chinæ fusc. grana xv.
Rhataniæ grana viii.
Succi citri med. gtts. xxx.
Balsam Indic.
" Nucist: expres.
Extract. Bardan. ana drachm. duas.
Camphor. triturat. grana xv.
Alcoholis 30° B. drachm. duas.
Medull. bovis, unciam un. et semis.
Ol. Provinc. unciam unam.
" Odoration. q. s.
Misce fiat ungentum lege artis.

Lond. Chem. from Buchn. Rep.

THE

AMERICAN JOURNAL OF PHARMACY.

OCTOBER, 1845.

ART. XLIII.—ON SYRUP OF WILD CHERRY BARK, AND ON THE POWER OF HYDROCYANIC ACID IN PREVENTING FERMENTATION.

By Daniel S. Jones.

A formula for the preparation of a syrup from the bark of the Wild Cherry, (Cerasus serotina) was first published by Messrs. Procter and Turnpenny in the American Journal of Pharmacy, vol. xiv. p. 27.

They direct four ounces of the powdered bark to be macerated in twelve fluid ounces of water for forty-eight hours, and then treated by displacement until twelve fluid ounces of infusion is obtained, which is made into a syrup by dissolving in it twenty-four ounces of pulverized sugar, without heat.

The concentrated form in which the properties of wild cherry bark are here presented, its agreeable taste, and the readiness with which it may be resorted to, either by itself or in combination with other remedies, gives it an advantage over the officinal infusion, and has caused it to supersede, to a great extent, that preparation. In some instances, however, the large amount of sugar employed constitutes an objection, as it is found to cloy and nauseate the stomach, particularly when its use has been continued for some length of time.

Having observed the perfect manner in which this syrup kept whilst others under similar circumstances readily fermented, and with a view of ascertaining whether a smaller quantity of sugar might not answer the purpose of preventing fermentation or decomposition of the preparation, I was induced to make the following experiments:—

An infusion was made by maceration, as above directed, and divided into four equal quantities. One portion was made into a syrup with the usual quantity of sugar, in the second the amount of sugar and infusion were equal; in the third the proportion was two of infusion to one of sugar; and in the fourth portion as three to one. They were then placed together in a situation where the temperature varied from 75° to 80° Fahr. No perceptible change took place in any of these syrups until about two months after they were prepared, although the corks of the bottles containing them were frequently opened. At this period a slight deposite of apotheme began to take place in the syrup containing the least quantity of sugar. In a short time after a similar precipitate was observed in the syrup, in which the infusion doubled the sugar in quantity. The syrup containing equal parts of sugar and infusion, kept perfectly, in all respects, like that made with the full proportion of sugar.

More than six months have now elapsed since these preparations were made (in which time they have been exposed to the ordinary temperature of the store during the past summer,) and the two last mentioned syrups remain unchanged, whilst the others, though they contain an increased deposite of apotheme, appear to retain their other properties unimpaired.

With the design of discovering whether the hydrocyanic acid present in these syrups was the cause of their not fermenting, an infusion similar to the other was boiled for some time, in order to dissipate that principle, and then divided into two portions. With one of these a syrup was made with twice its weight of sugar, and with the other an equal weight was used, and the syrups which they yielded were placed in a warm situation, similar to that of the preceding experiments. In twelve days the least concentrated commenced fermenting, and was soon covered with mould, and the other underwent the same change shortly after.

To test whether the tannin in wild cherry bark syrup played any part in preventing its fermentation, a syrup was made with an infusion of white oak bark, precisely like the preceding, and divided into two parts; to one was added five drops per ounce of hydrocyanic acid, containing four per cent., the other was left without addition. In a few days the latter commenced to ferment and soon spoiled, whilst that containing the hydrocyanic acid remains unchanged, notwithstanding its exposure to the great heat of last summer.

Syrup of Seneka snake root, which is always difficult to keep in summer, is entirely freed from a disposition to ferment by the addition of a little hydrocyanic acid.

When hydrocyanic acid is added to a mixture of yeast, sugar and water, all tendency to fermentative change is suspended, and the power of the yeast destroyed during the presence of the acid.

These facts are stated merely to illustrate the position that the ready keeping of a syrup of wild cherry bark, made without heat, is due solely to the hydrocyanic acid which enters into its composition,—and not with a view to this acid being used as a preservative agent, which of course its deleterious qualities entirely precludes.

As the above experiments prove conclusively that there is no objection to reducing the proportion of sugar in this syrup on the score of preservation, and as an excess of saccharine matter is often objectionable, it is recommended that the proportion of sugar to the infusion be as five to three instead of as six to three, as at present, which will increase its strength and render its manufacture more easy.

While on this subject it may be well to mention, that a much better way of effecting the solution of the sugar, is to introduce it into the infusion in a pulverized state, and agitate it until dissolved in a stopped bottle.

ART. XLIV.—EXTRACT FROM THE MINUTES OF THE BOARD OF TRUSTEES OF THE COLLEGE OF PHARMACY OF THE CITY OF NEW YORK, July 3d, 1845.

The Committee of Inspection, to whom the Opium exhibited at the last meeting of the Board, by Mr. W. L. Rushton, was referred, beg leave to report, that

The specimen of opium in question was a thin oval cake, which had been covered with a large leaf, whose impression still remained upon its surface. It was more soft and moist, and contained more gummy or mucilaginous matter than Smyrna opium. In fact, it answered in every respect, the description which Pereira (page 1728, vol. 2, Elements of Mat. Med. and Therap., 2d Eng. edition) gives from Professor Guibourt, of the inferior kind of the Constantinople variety

Parcels of 100 grains, or more, were examined by each of the committee, to ascertain the quantity of morphia it would yield. The result closely approximated, showing that not more than four per cent. could be obtained from the sample exhibited as above.

The committee has since been informed that the entire parcel, consisting of ten cases, was not sold in New York, but transmitted to Boston; but, as it may again appear in this market, it is thought advisable that the trade should be put upon their guard, lest purchasers, by some reduction in price, should be induced to buy without sufficiently careful examination. Thus far was therefore published in the Journal of Commerce and Express, and also in the Boston papers.

Your committee are informed that these ten cases of opium, after being sent to Boston, were sold to a wholesale druggist in this city, with a guarantee as to quality; samples being sent on to him, portions of these samples amounting to 1000 grains, were examined and found to fall short of the per centage of morphia mentioned above. Your committee also have learnt that other samples of the same opium, by order of the owner, have been examined by Dr. Jas. R. Chilton, who has given a certificate of its containing five per cent. of morphia.

All which is respectfully submitted.

Signed,
JOHN H. CURRIE, Chairman.

July 3d, 1845.

It was on motion, Resolved, That the report of the Committee of Inspection be sent to the publishers of the American Journal of Pharmacy, to publish if they think proper.

By order,
JOHN MEAKIM, Secretary.

REVIEW.

ART. XLV.—ELEMENTARY CHEMISTRY, THEORETICAL AND PRACTICAL. By GEORGE FOWNES, PH. D., Chemical Lecturer in the Middlesex Medical College and to the Pharmaceutical Society of Great Britain. With numerous Illustrations. Edited by ROBERT BRIDGES, M. D., Professor of General and Pharmaceutical Chemistry in the Philadelphia College of Pharmacy. Philadelphia. Lea and Blanchard, 1845. 1 vol., 12mo. pp. 460.

WITHIN a few years past the American chemical student has been particularly fortunate in having had placed at his disposal the works of several of the most prominent English chemists, in an American dress. Turner's, Kane's and Graham's have successively appeared, and now we have that of Fownes, which, whilst it makes no pretension, and is much more concise than the treatises before mentioned, deservedly claims to have presented the subject in a light and manner well calculated to facilitate the acquisition of chemical knowledge. Although the author has suited the arrangement of his work to the course of Lectures that he delivers; and has designed it as a "convenient and useful class book for his pupils," yet there are no peculiarities about it which unfit it for the general student, or for the pupils of other lecturers. The author's style is lucid, and he possesses the faculty of expressing much in a few words, so important in works of the kind.

The first division of the book is devoted to physics, and comprises the subject of specific gravity, the physical constitution of gases, heat, light, electricity and magnetism. This part of the work is fully illustrated by figures and diagrams, the importance of which, as helps in chemical study, is becoming every day more evident.

The second part comprises, first, a history of the non-metallic elements; afterwards, the compounds of these elements among themselves; and lastly, the general principles of chemical philosophy. This arrangement is out of the usual course. We are accustomed, in elementary works, to see the laws of combination, affinity, the atomic theory, and the influence that electricity exerts in the composition and decomposition of bodies, discussed, before treating of the bodies themselves; so that in afterwards reading of the properties of substances, their relations to each other become apparent. Of the propriety of this change there may be a difference of opinion; yet as most of the leading general laws of chemical philosophy are readily comprehended, and as even a partial knowledge of them adds much to the interest of chemical studies, some acquaintance with them previous to entering on a consideration of the elementary bodies and their compounds, seems almost indispensable.

The third division embraces the chemistry of the metals. After stating the general properties of the metals, a full chapter on crystallography follows, which comprehends the subject of isomorphism, or the relation which has been found to exist between the crystalline form and chemical constitution of bodies. The grouping of bodies in their isomorphous relations, is now considered the true basis of a natural classification; and although all the elements have not been brought under the arrangement, owing to the difficulty of discovering the crystalline structure of many of them; yet sufficient has already been ascertained to give the subject a deep interest. The binary theory of salts is cursorily treated of, and is favorably viewed by the author, although he admits of difficulties, yet to be removed, before it can be unhesitatingly adopted.

In treating of the metals and their compounds, the author has introduced several improvements, which add much to the usefulness of the work as a text-book. Among them is the illustration, by diagrams, of the more complex chemical changes, as in the rationales of the processes for making the mercurial chlorides, the sulphuret of antimony, and some of the cyanogen compounds. Another and equally important feature, is a short series of test directions, appended to each chapter on the metals, to enable the student to distinguish them and their compounds from each other. This is a decided improvement, and supplies a want which is often felt in referring to chemical works for that kind of information; for notwithstanding that most of it may be found in the ordinary treatises, yet it is scattered through the text and cannot so readily be resorted to. The free use of symbolic formulæ extends throughout the book, and give an air of exactness to all its parts.

In looking over the list of equivalent numbers of the metals, several changes appear, as is the case in Kane's and Graham's. The atomic numbers for mercury and gold are just one-half of Turner's number, and those for arsenic and antimony are doubled. The author observes: "As the salts of the red oxide [of mercury] are most stable and permanent, that substance may be regarded as the true protoxide instead of the grey oxide, to which the term has usually been applied. Until, however, the isomorphous relations connecting mercury with the other metals shall be established, the constitution of the two oxides, and that of the corresponding chlorides, iodides, &c., must remain somewhat unsettled."

In the case of antimony, the sesqui-oxide, sesqui-chloride and sesqui-sulphuret, become ter-compounds, in which one equivalent of the metal is united with three eq. of the other elements respectively. Ter-chloride and oxide of gold become sesqui-chloride and oxide;—and the acid oxides of arsenic become ter, and quinto, compounds allied in atomic arrangement to the acids of phosphorus.

However consonant with truth these alterations may be, the changes of nomenclature incident thereto are much to be regretted in a pharmaceutical sense—as the old chemical names for calomel and black oxide will now indicate corrosive sublimate and red precipitate.

The last, and by far the largest division, has been devoted to organic chemistry. The author regrets that in the composition of this portion of his work he has been compelled, by the short space allotted, to treat the subject in too brief and unsatisfactory a manner. The relative space on this subject, however, is greater than in the larger works, and the author has succeeded in giving a fulness of detail hardly to be expected. The subject is introduced by a chapter on the ultimate analysis of organic bodies, which is well illustrated with engravings.

Substances of the saccharine and amylaceous class, with their derivatives, by the action of fermentation, acids and alkalies, are first considered. Afterwards, the benzyle and salacyle series, the vegetable acids and alkalies, the cyanogen compounds, etc. The number and complexity of the subjects treated of, renders any notice of them individually out of place here; but it may be sufficient to state, that all important substances and processes have been dwelt upon, and a vast number of compounds of less interest noticed. The new views of Leibig, Mulder, and others, have been presented in the concluding chapters on animal chemistry, which brings the work down to the present time.

With respect to the book itself, saving the objection that the type is rather small and closely set, the typography is good, and the paper quite equal to that of other similar works. On the score of exactness, it will be sufficient to mention that it has passed under the close supervision of Dr. Bridges, who, besides correcting errors incident to a first edition, has added occasional notes of observations made since the issue of the English copy.

W. P.

ART. XLVI.—THE DISPENSATORY OF THE UNITED STATES OF AMERICA. By GEORGE B. WOOD, M. D., Prof. of Mat. Med. in University of Pennsylvania, and FRANKLIN BACHE, M. D., Prof. of Chem. in Jefferson Medical College. Sixth Edition: 1845. pp. 1368. Philadelphia: Grigg and Elliott.

A SIXTH edition of this useful and popular work has been put forth, thus presenting the latest and most accurate information upon the subjects of which it treats. A eulogy of the merits of the U. S. Dispensatory would be at this time misplaced, as it is familiar to the readers of this journal as an indispensable guide and the highest authority in the prosecution of their business; our views, moreover, have been already expressed, and we could not do more than repeat them. Since the publication of the previous edition so short a time has elapsed, that little could be found, comparatively, to add to the present. Such additions, however, have been made as the periodical press and other sources afforded, either in the way of extension to the matter which already constituted the work, or new matter arising from discoveries and improvement in the branches with which it is occupied. The latter more particularly will be noticed in the Appendix.

ART. XLVII.—OBSERVATIONS ON MYRRH.

By C. H. Ruickoldt.

According to Ehrenberg, myrrh is derived from *Balsamodendron Myrrha,* N. ab Esenb. It is secreted in the form of an oily juice from the bark of the tree, resembling cherry-gum, soon hardens by exposure to the air, and gradually becomes reddish or red-brown. In general only one kind is forwarded by way of Cairo, the *Myrrha naturalis,* which is then sorted in the European markets. It is doubtful what the ancients understood by myrrh. Its use as a medicine was known at the remotest periods; it was employed for fumigation in sacrifices, as a spice with food, for perfumery and for embalming the dead. The following are the kinds known in commerce:—

1. *Myrrha electa.*—Irregular, larger or smaller, angular or tear-shaped fragments, of a light yellow to a dark brownish-red colour, semi-transparent, usually coated with dust, but sometimes bright and possessed of lustre. On the surface of fracture it is uneven, has a waxy or fatty lustre, and exhibits numerous white curvilinear veins. The odour is peculiar, the taste bitter, balsamic. The specific gravity, according to Martius, is 1.360. When breathed on, the fragments exhibit a more lively lustre and are somewhat fatty to the touch. When chewed, this myrrh readily breaks into fragments and adheres firmly to the teeth; at the same time the saliva is rendered milky. On being heated, it puffs up, and burns with a very smoky flame.

2. *Myrrha naturalis seu in sortis* consists of the more impure pieces which remain after picking out the previous sort. We likewise meet in it with the impurities of the *Myrrha naturalis,* especially *bdellium,* further *gum-arabic* and cherry-tree gum moistened with tincture of myrrh, &c. The *bdellium* resembles the myrrh very much in appear-

ance, possesses a similar bitter taste, but a different, fainter odour, and is characterized by its great amount of bassorine.

3. *Myrrha Indica* (*Myrrha nova.*)—Irregular fragments, frequently three inches thick, brownish white, greenish, sometimes nearly black, tear-shaped, opake, with a waxy lustre. In odour and taste it resembles myrrh, but is more bitter.

Martius distinguishes a fourth kind, the *Myrrha alba*, which is sometimes found mixed with the other kinds; the fragments resemble *gum ammoniacum*, are more or less spherical, tear-shaped or angular, have a conchoidal fracture and a dull waxy lustre; the odour resembles that of myrrh; the taste is intensely bitter.

Myrrh was first minutely examined by Brandes in 1819; subsequently by Braconnot, Pelletier and Bonastre. The myrrh employed by the author in his investigation (*Myrrha nova*) consisted of irregular, knotty and roundish, tear-shaped fragments of about the size of a hazel-nut. It was of a wine-yellow colour, with a reddish tint, sometimes darker. The fresh fracture presented the lustre of wax, at some places that of resin, traversed by white opake stripes and some spots of the same colour; its odour was peculiar and aromatic; its taste likewise aromatic and bitter. Spec. grav. 1.12—1.18. On pulverization it formed into little balls, and left on paper a fatty spot. It did not melt on the application of heat, but puffed up, giving off white aromatic vapours, and was soon reduced to a coal. It left 3.65 per cent. of a white ash, which consisted principally of carbonate of lime, with some carbonate of magnesia, a little gypsum and peroxide of iron. Brandes and Braconnot found potash and phosphoric acid, which the author could not detect. With concentrated nitric acid the myrrh became of a blackish-brown colour, the nitric acid acquired a dirty violet-red colour; after long-continued action the resin was decomposed, and an orange-red sediment separated. When heated with concentrated nitric acid, it became blackish-brown, with the separation of some violet-red flakes, which however soon disappeared again, leaving behind an orange-red resinous mass. To determine the amount of water, 0.764 gms. of the powder was heated in a right-angled glass tube in the water-bath to 203° F. until no more moisture was given off. The fluid which escaped was clear, colourless, had a faintly-acid reaction, and amounted to 1.475 per cent. of the myrrh. The residue, which was half-fused, melted still more on the application of a stronger heat over a spirit-lamp, giving off a yellowish, turbid, strongly-acid liquid, on which floated some dark brown drops of an empyreumatic oil; at the same time a large quantity of yellowish-white vapours was given off.

15 gms. myrrh were heated with about 20 times the quantity of water in a retort until about half the liquid had passed over. When the apparatus had cooled, the upper portion of the retort and the recipient were found coated with a whitish resinous body, which was soft to the touch, but after a time became hard and brittle. The distillate was milky and deposited some yellowish-white flakes, but no traces of oil. The resinous coating was dissolved in alcohol after removal of the liquid, and left on slow evaporation a light brown solid resin, which dissolved entirely in alcohol, far the greatest portion in ether, and almost wholly in caustic potash, formed a blackish-brown mass with nitric acid, and was nearly insoluble in acetic acid. The gum of the myrrh had dissolved almost entirely during the distillation, so that very little was left on the filter. The nearly-clear filtered solution left on evaporation a brownish extract, which on treatment several times with warm spirit yielded a brownish mass. The alcoholic extract left on evaporation a soft resin, which was almost wholly soluble in alcohol, was not precipitated by water, and had an acid reaction. Ether scarcely altered it; nitric acid dissolved it to a clear reddish-brown liquid, which after a few hours became yellow; caustic potash afforded a clear brown solution with it, leaving behind a few flakes.

30 grms. of pulverized myrrh were exhausted with alcohol of 0.831 spec. grav. at a temperature of about 60° F. The dry residue formed a yellowish-white mass easily reducible to powder, of a faint odour and taste of myrrh; it amounted to 48.330 per cent. Amylum could not be detected in it by iodine. It dissolved in cold, but more readily in boiling water, and when filtered left a residue, from which alcohol still removed some resin, the quantity of which after complete exhaustion amounted to 3.862 per cent. of the myrrh. If we subtract the weight of these impurities, as well as that of the ash from that of the entire residue, there remains 40.818 per cent. for the gum, which is very closely allied to Arabin. The aqueous filtered solution yielded no coagulum on boiling, and left a gummy brittle body of vitreous lustre. The somewhat concentrated solution gave, when mixed with twice its volume of alcohol, a white turbidness; with protonitrate of mercury a white precipitate, soluble in an excess of the reagent; with pernitrate of mercury a white precipitate, insoluble in an excess of the precipitant; with neutral and basic acetate of lead a white precipitate; with perchloride of iron a transparent gelatine, and the same with borax. On boiling with nitric acid, the gum was converted into mucic and a little oxalic acid. The alcoholic extract was carefully distilled. When about half the alcohol had passed over, the contents of the retort became turbid, and deposited an oily body, which was separated and the distillation continued, when a further separation took place. To free this balsam-like body from water and alcohol, it was placed for several days over chloride of calcium under a bell-glass. There remained a clear brownish-red liquid, of the consistence of thin turpentine, and of a strong odour and taste of myrrh. Alcohol dissolved it again, and yielded on mixing with water an acid liquid. It was wholly dissolved by ether, was coloured chocolate-brown by cold nitric acid, and on the application of heat formed a porous yellowish-brown mass; the acid

became violet, and subsequently yellow. Acetic acid yielded a violet-red solution with it; caustic potash had very little action upon it. This resinous body presented on elementary analysis the following composition:

Carbon	-	-	77.130	22	=	77.40
Hydrogen	-	-	8.870	15		8.68
Oxygen	-	-	14.000	3		13.92

To ascertain the nature and amount of the ethereal oil, the alcoholic extract was distilled until the residue began to acquire a thickish consistence. After removal of the alcohol from the recipient, some grammes of water were added to the retort and the heat was increased; a faintly-yellow oil passed over with the aqueous vapour. The addition of water was renewed, and the distillation continued as long as perceptible traces of oil passed over. The residuary resin was on cooling brittle, clear, light brownish-red. Alcohol dissolved it almost wholly; with water it yielded a white turbid liquid, which had an acid reaction In ether it was readily soluble; by nitric acid it became first violet, then brown; caustic potash had scarcely any action on it. The distilled oil of myrrh (*Myrrhole*) was of a light vinous-yellow colour, thick, and possessed a penetrating odour and taste of myrrh. After standing for some time exposed to the air, it became thicker and its colour darker; its quantity amounted to 2.183 of the myrrh; it was lighter than water, heavier than alcohol. Both ether and alcohol readily dissolve it. The composition of myrrhole is—

	I.	II.	Mittel.			
Carbon	79.820	80.150	79.985	22	=	80.440
Hydrogen	9.867	10.430	10.149	16½		9.920
Oxygen	10.313	9.420	9.866	2		9.640

It is remarkable that the per-centage composition of myrrhole agrees very nearly with that of colophony and of sylvic acid:—

	Colophony.	Sylvic Acid.	
	(Blanchet and Sell.)	(Liebig and Trommsdorf.)	
Carbon	80.04	79.74	79.66
Hydrogen	10.01	9.82	9.82
Oxygen	9.95	10.44	10.52

The resin of the myrrh was obtained from an alcoholic extract by distilling off the greater portion of alcohol, and then evaporating it. A portion of the oil must still have remained with the resin. The latter was reddish-brown, transparent, brittle, of conchoidal fracture, and amounted to 44.760 per cent. of the myrrh. When heated, it gave off vapours with the odour of myrrh, readily took fire, and burnt to within a small trace of residue. Its melting-point is between 194° and 203°; it dissolves wholly in ether, but only partially in alcohol; water produced a turbidness in the solution, which did not redden litmus-paper. Muriatic acid produced a flocculent turbidness. Boiling caustic potash dissolved it partially; acetic and sulphuric acids yielded with it a clear solution. It is therefore a neutral resin, and may be called *Myrrhine.* Its composition is—

	I.	II.	III.				
Carbon	71.960	72.840	72.760	72.400	21	=	72.24
Hydrogen	8.175	8.129		8.152	16		7.92
Oxygen	19.865	19.031		19.448	3		19.84

A small quantity of the resin was heated in a glass tube to 334° until it ceased to froth. The liquid which had collected at the other end of the glass tube was perfectly transparent, and of a strong acid odour and taste. A small quantity of a soft resinous body had deposited itself on the sides of the tube. When cold, the mass was dark reddish-brown, very brittle, transparent, possessed great lustre, but scarcely any odour or taste. Ether dissolved the resin almost entirely, and also alcohol; the latter yielded with water a turbid acid liquid. Nitric acid acquired with it a violet opalescence, and on warming became yellow. Sulphuric acid gave a clear reddish-brown solution with it. Since this acid resin is formed by fusion from the myrrhine, it may be called *myrrhic acid.* Elementary analysis gave—

	I.	II.				
Carbon	75.430	75.310	75.370	24	=	75.222
Hydrogen	7.946	8.063	8.005	16		8.250
Oxygen	16.624	16.627	16.625	4		16.528

According to this analysis therefore the myrrh contained in 100 parts—

Essential oil	2.183
Resin	44.760
Gum (arabine)	40.818
Water	1.475
Impurities	3.862
Carb. of lime with carbonate of magnesia	3.650
Some gypsum and peroxide of iron	
	96.748

Myrrhole undergoes decomposition by exposure to the air, as does also the resin when heated either alone or with water. It is probable therefore that the *Extractum myrrhæ aquosum* contains an altered resin. It is also probable that the semiresin discovered by Brandes, and also that called by Bonastre subresin, were formed in the course of the analysis by the decomposition of the myrrhine. From the formulæ obtained, the transition of the oil into the resin is readily apparent. If we double the number of the equivalents we have—

Myrrh	$C^{44}H^{33}O^{4}$
Myrrhine	$C^{48}H^{32}O^{10}$
Myrrhic acid	$C^{48}H^{32}O^{8}$

The quantity of oxygen is, according to this, smaller in the acid resin than in the neutral one; the latter probably contains a portion of its oxygen and hydrogen in the state of water. The balsam is, at all events, a mixture of oil and resin, and forms the transition from the former into the latter.—*Lond. Chem. Gaz. from Archiv. der Pharm.*

ART. XLVIII.--ON THE PREPARATION OF PURE PHOSPHORIC ACID.

By Dr. Gregory.

Dr. Gregory states that he has not found the alcohol process for separation of the phosphate of magnesia, in the preparation of phosphoric acid (described in his recent work, p. 110,) to answer. He recommends the following as preferable:—

Having removed the lime by means of sulphuric acid, and evaporated the filtered liquid (filtering again if any sulphate of lime separates during the evaporation) to the consistence of syrup, a few drops of sulphuric acid are added, to make sure that no lime remains. Of course, if turbidity ensues, the lime has not been completely separated before; and the addition of sulphuric acid, filtration after adding some water, and evaporation, must be repeated till the syrupy liquid continues quite clear when sulphuric acid is added. This liquid now contains only the phosphoric acid, the magnesia, and the excess of sulphuric acid. It is concentrated, and heated in a covered platinum crucible until the whole of the sulphuric acid has been expelled, and the residue has acquired a low red heat. On cooling, it forms a glass, perfectly colourless and transparent, which contains only phosphoric acid and the magnesia of the bones. This glass when boiled with water dissolves rather slowly, but completely. When the solution is again concentrated in a capsule of platinum until most of the water is expelled, and the temperature rises to between 595° and 600° Fahr., it suddenly, while hot, becomes turbid, from the separation of a peculiar phosphate of magnesia. At the same moment the phosphoric acid begins to crystallize like the granular sugar deposited in honey, a form ascribed by Peligot to the bibasic or pyrophosphoric acid. If the same temperature be kept up for 15 minutes, the whole of the magnesia separates in the form of a powder, which is quite insoluble in acids or water; when cold, the mass is digested with water, which dissolves the phosphoric acid, leaving the phosphate of magnesia as a heavy, fine, snow-white powder, of a faint silky lustre. *The filtered liquid is free from every trace of magnesia,* and may be considered as pure phosphoric acid. If the bones contain chloride of sodium, a trace of phosphate of soda will remain. In that case the burnt and powdered bones ought to be boiled with water, to remove any soluble chloride. Dr. Gregory recommends this process as a simple one for obtaining pure phosphoric acid. It is necessary to keep up the heat of about 600° for 12—15 minutes, but not to go beyond that temperature, because a stronger heat would again, no doubt, produce the glass formed in the first fusion, which as we have seen is entirely soluble in water. The acid is easily tested for magnesia by diluting and supersaturating with ammonia; when, if magnesia be present, it very soon appears as ammoniaco-magnesian phosphate. The phosphate of magnesia thus separated is a peculiar and anomalous salt. From six analyses Dr. Gregory induces the formula $2MgO + 3PO^2O^5$, that is, an acid sesquiphosphate of magnesia, according to the older notions of phosphoric acid. This composition cannot be reconciled with any of the three generally admitted modifications of phosphoric acid; and it would seem to indicate, either that another modification exists, or that the theory of phosphoric acid and the phosphates at present admitted is erroneous. Dr. Gregory is engaged in the examination of this point. The insolubility of the phosphate is very great, and presents a great obstacle; for boiling nitric acid, aqua regia, are almost entirely without action upon it; and it is, he believes, the only salt of magnesia insoluble in acids.—*Ibid from Med. Gaz.*

ART. XLIX.—ON A METHOD OF PURIFYING ARSENIFEROUS SULPHURIC ACID DURING ITS MANUFACTURE.

By M. Alph. Dupasquier.

Arsenical sulphuric acid is prepared in several large manufactories in France and England by the calcination of pyrites (sulphurets of copper and of iron more or less mixed with sulphuret of arsenic and arseniuret of iron.)

From the experiments and observations contained in this memoir it results—

1. That the use of arseniferous sulphuric acid in the arts, and in the production of chemical and pharmaceutical preparations, may lead to serious disadvantages and danger.

2. That arsenic in the sulphuric acids of commerce is in the state of *arsenic acid.*

3. That the proportion of this poison in the acid varies, but that it may be estimated at about 1- or 1½-thousandth.

4. That the employment of hydrochloric acid or sulphuretted hydrogen is insufficient for the purification of arseniferous sulphuric acids.

5. That the use of alkaline sulphurets offers a complete and ready method for the purification of the arseniferous acids.

6. That the sulphuret of barium, both as regards economy and the purity of the sulphuric acid, is by far preferable to the other alkaline sulphurets, and it is moreover cheap and very easy to put in practice during the preparation of sulphuric acids in the manufactories.*

Ibid from Comptes Rendus.

---

*By the employment of this method, not only is the arsenic entirely eliminated, but the nitric acid is also necessarily destroyed, an acid which occurs in most of the sulphuric acids of commerce.

ART. L.—ON DIGITALIC ACID AND THE DIGITALATES.

By M. Pyrame Morin.

To prepare this acid, the leaves of the plant are to be treated with hot water; the infusion is acid, and is to be evaporated on the water-bath to the consistence of a thick syrup; to the residue a large quantity of alcohol is to be added until it produces no further precipitation; it is to be suffered to remain for some days till a deposit is formed, which ought not to be bitter, but which is so if the alcohol be too strong.

The liquid is then to be filtered, and distilled in a water-bath till it becomes a thick extract, which is to be treated with pure sulphuric æther, and kept at a moderate heat for an hour and eventually boiled; this operation is to be repeated several times.

The æthereal tinctures thus obtained are acid, and have a slightly greenish-yellow colour, especially the first portions. By this process the bitter principle, or digitaline, and the digitalic acid are dissolved; to this æthereal solution barytes in fragments is to be gradually added, which forms a yellowish precipitate, and when any remains insoluble, or the solution restores the blue colour of reddened litimus, enough barytes has been added.

The liquor, which contains only digitaline, but not perfectly pure, is then to be filtered. The precipitate is to be collected, which is to be washed with æther to remove all the bitterness, and then with alcohol, till it passes but slightly or not at all coloured.

The precipitate is to be diffused through cold water and mixed with sulphuric acid to precipitate the barytes; and it is better to leave some digitalate of barytes undecomposed than to add too much acid. By filtration, a strongly acid, reddish-coloured solution is obtained; this is to be slowly distilled in a glass retort in order to separate much of the water, and care is to be taken that the heat is not too great. On cooling, a small quantity of a brown substance decomposes, the clear liquor is to be poured off, and sufficient alcohol is to be added to it to precipitate any digitalate of barytes which may have escaped decomposition; by evaporating the liquor *in vacuo*, crystals are abundantly formed.

In all these operations it is requisite to avoid the contact of air as much as possible, for the digitalic acid is converted by it into a brown substance: notwithstanding the evaporation *in vacuo*, the formation of this substance cannot be prevented, and the crystals are consequently formed in a liquid of a deep colour; the more the action of the air is prevented, the purer are the crystals obtained. The crystals are to be separated by and pressed between filtering paper, dissolved in a small quantity of alcohol, and again crystallized *in vacuo*, by which they are obtained white.

The properties of digitalic acid thus obtained are, that it crystallizes in long needle-form crystals; it possesses a slight peculiar odour, which is increased by heat, and it yields a suffocating vapour, a small quantity of which occasions coughing; at a higher temperature it melts, becomes black, and burns with a white flame; it leaves a charcoal which readily burns without residue; no ammonia is produced during the decomposition by heat.

The acid when pure is perfectly white; but the action of light, heat and air upon it is very great, readily converting it into a brown product, which colours the solution, and from which it is difficult to free it, and on this account the greatest care must be taken during its preparation. When the acid is dissolved in a small quantity of water, it may be converted during evaporation by the water-bath into a deep-coloured substance: this is itself acid, insoluble in water, slightly soluble in æther, and readily so in alcohol.

Digitalic acid becomes still more readily brown by the action of alkaline bodies; thus in preparing it, excess of barytes must be avoided.

Digitalic acid has a sour but not disagreeable taste; it immediately reddens litmus paper, expels carbonic acid from carbonates, and forms digitalates, and combines directly with basic oxides, and the soluble salts which it forms become readily yellow in the air.

M. Morin states the properties of the following digitalates:

Digitalate of Soda.—Obtained by exactly saturating the acid with carbonate of soda, and evaporating the solution under the air-pump vacuum. It is white, and crystallizes very well, but by exposure to the air it becomes quickly yellow, and so also does the solution. It is very soluble in water.

Digitalate of Potash.—Obtained by decomposing the carbonate in the same way as the preceding. It crystallizes with difficulty and is very soluble in water.

Digitalate of Magnesia.—Obtained from the acid and carbonate of magnesia; soluble in water.

Digitalate of Barytes.—Obtained by saturating the acid either with barytes or the carbonate. It is soluble in water but insoluble in alcohol and in æther. Quite colourless, but by exposure to air and heat it becomes brown.

Digitalate of Lime is obtained in the same way as the barytic salt, with which it has great analogy; being insoluble in alcohol and in æther, it may be employed for the preparation of digitalic acid.

Digitalate of Zinc.—Obtained by treating the carbonate with digitalic acid; the filtered solution is to be evaporated by the air-pump vacuum.

This salt is formed notwithstanding an excess of carbonate. It is obtained at first as a transparent salt, having the appearance of a thick solution of gum; but after some days a number of small arborescent crystals are formed. This salt does not so quickly become yellow by exposure to the air as those previously described.

Digitalate of Lead.—A white, heavy, insoluble salt.

Digitalate of Copper.—A greenish, soluble salt.

Digitalate of Silver.—A white salt, insoluble in water, but soluble in nitric acid.

A solution of digitalate of soda gives, with protosulphate of iron, an abundant flocculent precipitate; with the peracetate of iron it produces no effect; these reactions prove, according to the author, that digitalic acid cannot be mistaken for gallic acid.

This acid exists, probably, uncombined with digitaline, for after having treated the watery extract with alcohol, an abundant brown precipitate is obtained, which is devoid of bitterness, but possesses an acid reaction, and digitalic acid may be obtained from it.

M. Morin observes, that the peculiar properties of digitalic acid, as such, appear to him to be sufficiently established; though it may, he states, be objected, that it is formed under the influence of the substances, especially of barytes, employed to obtain it; but to this objection it is replied, that the juice of the digitalis possesses an acid reaction as soon as it is procured; that the dry leaves treated with water, alcohol, or æther also yield acid solutions; if the alcoholic or æthereal solution, obtained during the preparation of the acid, be saturated with oxide of lead, the liquor remains bitter, and a precipitate is formed; if this be washed in the water and alcohol, and then treated with hydrosulphuric acid, the excess of which is to be expelled, a very acid solution is obtained, from which digitalic acid is obtained by crystallization. This process the author thinks may, perhaps, be better than that which he has described, unless it be wished to obtain the bitter principle at the same time; in this case the action of the base employed is not sufficienty energetic to allow of the formation of a secondary product; the same effect may be produced with carbonate of ead.—*Ibid, from Journ. de Pharm. et de Ch.*

ART. LI.—ON SULPHUROUS ÆTHER.

By MM. Ebelmen and Bouquet.

In the action of alcohol on the chloride of sulphur, a new æther, sulphurous æther, is produced under the following circumstances:—When absolute alcohol is poured over protochloride of sulphur, disengagement of heat results, with formation of hydrochloric acid gas and a deposit of sulphur. On continuing to add alcohol until all reaction has ceased, and then distilling the mixture, there first passes over at about 176° an abundant product, which is nothing further than alcohol acidified by hydrochloric acid. On continuing the application of heat, the temperature of the liquid rises rapidly, and is rendered clear by the fusion of the sulphur which it held in suspension, becomes of a brownish-red colour, and parts between 302° and 338° with a product, which is collected separately. There remains in the retort a considerable deposit of fused sulphur.

The liquid, distilled between 302° and 338°, having been rectified until its boiling-point remains constant, a limpid colourless fluid is obtained, of a peculiar æthereal odour, somewhat analogous to that of mint; its taste is at first cooling, then burning, and it has a sulphureous after-taste. It boils at 322°; its density is 1.085; it dissolves in every proportion in alcohol and in æther at 61°. Water causes a precipitate in these solutions, and redissolves the deposit only very slowly, acquiring a very strong odour of sulphurous acid.

The æther, which had been prepared for some time and preserved in badly-corked bottles, likewise underwent an analogous decomposition from the action of the moist air.

The analysis of this product has led to the formula SO^2, $C^4 H^5 O$, which represents two volumes of vapour. The calculated density would be 4.76; the experiment yielded an almost identical number, 4.77.

To complete the history of this body, we have yet to study the action of chlorine on it; this gas is absorbed in large quantity under the solar influence, but the state of the weather has not as yet permitted us to obtain the definitive product of the reaction.—*Ibid from Comptes Rendus.*

ART. LII.—ON THE ROOT OF COHATE, A NEW DIURETIC MEDICINE.

By M. Arnozan.

The rhizome of cohate, furnished by a vegetable of the family of the graminaceæ, presents, like the suckering of monocotyledanous plants, approximated and converging nodiform divisions: it sometimes presents remains of radical leaves, thick and fleshy fibres; its external colour, of a reddish brown, seems to denote that it must grow in a ferruginous soil. The plant itself reaches nearly to the height of a man, and is sometimes in advance of the bark of thick woods.

Masticated and held for some time in the mouth, this root at first insipid, manifests an aromatic taste, which arises from its bark. M. Arnozan had an opportunity of examining old and recent roots, and both qualities presented the same characters.

In examining this sample of cohate in a qualitative point of view only, this pharmacien found in it gum or mucous matter, starch, an insipid waxy substance, soluble only in alcohol, and a resinoid matter, possessing the same color as the root, and an evidently aromatic taste; it is the latter substance which he considers as the native principle of the root.

In comparatively examining the results of different treatments by water, with and without heat, by alcohol, and by ether, the decoction alone seemed to combine all the qualities indispensable to an efficacious medicine, as regards both the possibility of being administered easily, and the advantage of being charged with all the active principles of the root. It is, moreover, the popular mode followed for the employment of this remedy in Havannah, where the decoction is taken as a draught.

According to the statement of several persons who have witnessed the use of this root in the island of Cuba, cohate enjoys diuretic properties, which seem to be more prominent in it than they ordinarily are in the roots of other vegetables of the same family; it is also highly extolled as a remedial agent in œdematous affections; it is even regarded as the only remedy which can be efficaciously employed for the negroes coming from the coast of Africa, who are, for the most part, dropsical at the time of their arrival; and its employment is so general, especially in the habitations, that the colonies are constantly provided with it, and cultivate it on purpose.

M. Arnozan mentions that, some years ago, a woman who was engaged, near Bordeaux, in the cultivation and collection of medicinal plants for pharmaceutical purposes, received a certain quantity of this recent root in order to try to cultivate it. The attempt was not successful; but the woman, who knew the therapeutical properties of cohate, administered a draught of it to a dropsical person, who experienced great benefit from it. This patient continued to use it for three years, and always with evident advantage.

Since the communication made by M. Arnozan to the *Société de Médicine de Bordeaux* on the properties of cohate, Dr. Pereira has given a draught prepared with 2 grammes of this plant to 2 quarts of water reduced to half, to a man attacked by disease of the heart, and presenting a very intense leucophymasia, and the diuretic effect of the new medicine was powerful.—*The Chemist, from Journ. de Med. de Bordeaux.*

ART. LIII.—BERZELIUS ON THE URINE.

The distinguished Swede, after giving a most elaborate account of the composition of this animal fluid, proceeds to point out how much its composition is affected by a variety of substances when taken into the stomach. The following examples will abundantly prove the truth of this remark.

After the free use of mercurial ointment, the urine is found to contain salts of this metal in minute quantities. To detect their presence, we have only to dry the sediment that is precipitated, and then to calcine it: globules of mercury may thus be obtained.

Nitre, the yellow prussiate of potash, and many metallic salts, especially those of iron, may readily be dissolved in the urine not long after they have been swallowed.

After the employment of large quantities of any ferruginous preparation, the urine sometimes acquires a feeble bluish or greenish hue—owing, says Berzelius, to the union of the iron with the ferrocyanic acid, which may be generated by the decomposition of different animal matters within the body itself.

Soon after tartaric or oxalic acid has been taken into the stomach, the urine often deposits, as it cools, oxalic or tartrate of lime—a deposit that is increased by the addition of the chloruret of lime to the fluid. The malic, citric, and tartaric acids render the urine more or less decidedly acid.

Succinic acid also reappears in the urine. Not so, however, with the benzoïc acid; for this seems to become transformed within the organism into hippuric acid—according to the observations of Wöhler, Boyé, and Leaming.

The infusion of nut-galls is known to pass into the urine; for a black precipitate is found to be formed on the addition of ferruginious solution. After the administration of odine, the iodurets of potash and ammonia are discoverable. The alkaline carbonates also, the borates, silicates, and the chlorates may be detected by the addition of their respective reagents. The same holds true of the yellow prussiate of potash; the red prussiate is converted into yellow. The sulphuret of potassium is absorbed in part only, without alteration; part becoming oxydised during the circulation, and converted into a sulphate.

The vegetable salts, having potassa and soda for their bases, are transformed into carbonates; for the urine is then found to be alkaline, and to effervesce on the addition of an acid. The same phenomenon is often observed when a person has been eating very freely of certain fruits, as apples cherries, strawberries and raspberries, which contain the malate or the citrate of potassa. This fact explains the utility of these fruits occasionally as a remedy in uric acid gravel.—*Ibid, from Journal de Pharmacie.*

ART. LIV.—ON CARRAGEEN MOSS.

By. M. E. Mouchon.

M. E. Mouchon, pharmacien at Lyons, has published in a recent number of the *Journal de Chimie Médicale*, several formulæ intended to facilitate the administration of carrageen, and consequently to extend its therapeutical employment. Carrageen is a substance which, without contradiction, deserves the attention of practitioners, on account of the abundance of its gelatinous, demulcent, and nutritious principle; moreover, the formulæ of M. Mouchon appear so rational that we hasten to lay them before our readers.

1. *Gelatine of Carrageen.*

Carrageen was submitted to three successive decoctions to almost completely exhaust it of its gelatinous matter, then the decoctions were evaporated on sand-baths, in a glazed saucepan to the consistence of a thick syrup, and the concentration was finished on the stove to almost perfect dryness, in moulds of white iron, covered with a thin layer of cacao butter, and furnished with gelatine, in such a manner as to form thin, transparent, and easily pulverised plates, especially by mixing the matter with sugar.

One gramme (15½ grains) forms 180 grammes of water into a jelly, and constitutes with 90 grammes of water, and as much sugar, an equal quantity of a sufficiently consistent product.

2. *Saccharide of Carrageen.*

To obtain this product we have only to add to the gelatinous liquid, concentrated to the consistence of a thick syrup, four times as much sugar as carrageen. The operation is completed in a sand-bath, care being taken to stir the syrup often until every portion may easily be powdered.

3. *Tablettes of Carrageen.*

℞—Saccharide of carrageen,	500 grammes.
Gum tragacanth,	4 "
Common water,	45 "

M. and F.S.A. tablettes of 2 grammes, which may be aromatised at will.

4. *Syrup of Carrageen.*

℞—Carrageen,	30 grammes.
Spring water,	2,000 "

The carrageen is exhausted by boiling for half an hour, strained with pressure, and

Simple syrup of 30° 4,000 grammes

are added.

The mixture is heated to reduce it to the weight of the syrup employed.

This syrup appears to be able to be substituted with great advantage for syrup of gum arabic. It has a certain analogy with syrupum *heliciis* and with syrup of gum tragacanth, which may possess in certain respects the same medicinal properties.

5. *Paste of Carrageen.*

℞—Carrageen,	123 grammes.
Common water,	12,000 "

It is boiled for half an hour with two-thirds of the water, and strained, and the residue is submitted to a second decoction with the remaining water. After new pressure, the two decoctions are united, and there is added to them

White gum Senegal, 1,000 grammes,

which must be rapidly mixed in and dissolved with heat. The solution is strained; and there is added to it,

Loaf sugar, 1,000 grammes,

then the product is exposed to the long-continued action of a boiling hot sand-bath; and when it is judged sufficiently concentrated, it is laid in thin layers in moulds of white iron, on the surface of which cacao butter has been spread. The concentration is finished in a good oven, which completes it in a few days to such a point that the paste may easily be detached.

This paste which is very agreeable to the taste, especially when it is aromatised with tincture of orange or any other aromatic, may be compared to the paste of lichen, and deserves even to be preferred to it.

6. *Jelly of Carrageen.*

℞—Carrageen,	2 grammes.
Common water,	250 "

It is boiled for half an hour, strained with pressure, and there is added to it,

Sugar, in pieces,	40 grammes.

It is concentrated until the solution is reduced to 125 grammes, which is again strained, and aromatised with a few drops of tincture of orange or lemon.

This jelly has the advantage of being preserved intact for a very long time. When it is prepared without sugar, it contracts, after being kept a few days, a slight fishy taste; but this never occurs when sugar has been added.—*Ibid, from Gazette des Hôp.*

ART. LV.—EXAMINATION OF THE VIEWS ADOPTED BY LIEBIG ON THE NUTRITION OF PLANTS. Read before the Botanical Society of Edinburgh, Feb. 13, 1845.

By Dr. Seller.

Dr. Seller contrasted Liebig's view of the mineral nature of the food of plants with that which represents their food as organic, and traced out the consequences deducible from this last hypothesis as affecting not merely the vegetable, but the animal kingdom also, the latter being ultimately sustained solely by vegetable substances. He showed that, whereas the view adopted by Liebig in nowise restricts the duration of the organised kingdoms, so long as they remain exempt from the influences of destructive agencies from without, the opposite view involves the conclusion that the whole of organic nature is hastening rapidly to dissolution from inherent causes; and he affirmed that were certain data somewhat more carefully considered, the period of the final extinction of plants and animals, in accordance with this hypothesis, might be pretty nearly determined.

He regarded this question as one not merely of high interest in itself, but as bearing expressly on the solution of the problem, whether the food of plants be organic or mineral. Dr. S. calculates the annual conversion of the carbon of organic matter into inorganic carbonic acid at not less than 600,000,000 tons; and infers, on the most favorable aspect of the amount of soil over the earth's surface, that such an annual loss could not be withstood beyond 6,000 years; and, on a less exaggerated assumption of its amount probably very near the truth, that the waste would absorb the whole of the existing organic matter of the soil in about 740 years.

Dr. S. contends that the truth of these conclusions remains unaltered, even if it be conceded that much of the carbon of plants is drawn, not from the organic matter of the soil, but from the inorganic carbonic acid of the atmosphere, unless some inorganic source of their hydrogen and oxygen be at the same time admitted. He therefore regards Liebig's views of the inorganic nature of the food of plants as supported, not merely by many special facts—for example, by the increase of the organic matter of the soil, often observed during the growth of plants—but also by the general view of the earth's surface just taken, because there is nothing in its aspect to warrant the idea that its means of maintaining the organic kingdoms are declining with the rapidity indicated in the statements just made.

He next examined Liebig's views of ammonia.

1st. As the sole source of the nitrogen of plants, and thereby of animals.

2d. As having its exclusive origin from the interior of the earth, and never from the nitrogen of the atmosphere. In regard to these statements he made it appear, as there is no evidence of ammonia being thrown forth from the bowels of the earth at all times, in quantities proportioned to the waste of it necessarily sustained at the surface, by decomposition into uncombined hydrogen and nitrogen, that Liebig's view of ammonia infers the same limitation of the existence of the organic kingdoms to a few thousand years, as is deduced from the hypothesis of organic matter being the food of plants.

Here, therefore, he differed from Liebig, contending that ammonia must be produced from the nitrogen of the atmosphere, and showing the probability of what is taught by Professor Johnson, namely, that the nitrogen of nitrates formed from the atmosphere, is fixed by plants, as well as the nitrogen of ammonia. In conclusion, he reviewed the evidence of potassa, the phosphates, and the other saline matters, of both organic kingdoms, being derived originally from the crumbling of rocks, and dwelt on the retardation of vegetable physiology, by the long scepticism of botanists on this head, owing, as he believed, to their distrust in the conclusions of chemistry; and went on to show that chemistry must be the ground-work of vegetable physiology in its present stage, and that the frequent changes in the aspect and nomenclature of chemistry did not materially affect the facts which it daily affords for the elucidation of the vegetable economy.—*Chemist.*

ART. LVI.—EXPERIMENTS ON THE PREPARATION, PROPERTIES AND COMPOSITION OF VALERIANIC ACID AND SOME OF ITS SALTS.

By Dr. C. G. Wittstein.

Valerianic acid, the salts of which have of late been so much recommended, is, as is well known, not solely a natural constituent of valerian, but is likewise formed artificially in various chemical reactions upon organic bodies;

for instance, in the action of caustic potash upon potato fusel oil. Admitting however that the artificial acid is perfectly identical in a therapeutical point of view with the natural, yet the most advantageous method of obtaining it appears for the present still to be from the plant.

Preparation.—The author brings for this purpose 20 lbs. (18$\frac{2}{3}$ oz.) of dry and finely-cut valerian root with 100 lbs. of water into a copper still, and draws off 30 lbs. The recipient employed is a Florence flask, in order not to lose the æthereal oil, which constantly amounts to 3—3$\frac{1}{4}$ oz. for every 20 lbs. of root. 30 lbs. more water are added to the residue in the still, as much drawn off, and this addition and distillation repeated once more. The root is then so exhausted that what passes over no longer reddens litmus; the contents of the still, however, turn litmus red; but this does not arise from valerianic acid, but from another non-volatile organic acid. No addition of acid, as recommended by Rabourdin to liberate the valerianic acid, is consequently requisite. The three aqueous distillates are saturated after removal of the essential oil with carbonate of soda, evaporated in a copper vessel to within a few pounds, then filtered and evaporated to dryness on a sand-bath in a counterpoised porcelain dish. Having ascertained by weighing the amount of valerianate of soda, it is dissolved in an equal weight of water, poured into a retort of 6 to 8 times the capacity, and a mixture consisting of 1 part concentrated sulphuric acid and 2 of water added, so that there be 4 parts of concentrated acid for every 5 parts of dry valerianate of soda. The soda instantly combines with the acid, forming sulphate of soda, and the liberated valerianic acid floats as a brown oil on the saline solution. By distillation in the sand-bath it passes over along with the greater portion of the water. The contents of the recipient are emptied into a tall cylinder, left some time in quiet, and the oily acid separated from the subjacent aqueous layer; the aqueous solution is likewise preserved, being a concentrated solution of the acid. To concentrate further the acid thus obtained, which is still combined with 3 equiv. water, it is submitted alone to fresh distillation; and as soon as the liquid which passes over appears in clear drops and not turbid, the receiver is to be changed; what now distils over is the monohydrated acid.

Pure valerianic acid is a colourless or pale yellow liquid, resembling an essential oil, of a penetrating odour, somewhat different from the æthereal oil of valerian, and of very acrid, acid, disagreeable taste, calling to mind that of valerian. It floats on water, which dissolves 1 part in 26. The solution has a strong acid reaction, and possesses a somewhat mild and sweetish taste. Its combinations with bases, for instance with soda, have a sweet but at the same time valerian-like taste. It dissolves readily in strong alcohol and in æther. It is perfectly volatile, and when heated in a platinum spoon burns with a luminous flame. Its composition in the anhydrous state corresponds, according to Ettling and Trommsdorff, to the formula $C^{10} H^9 O^3$. The first hydrate contains 1 equiv. water. To determine the composition of the second hydrate, a solution of 30 grs. of carbonate of soda was added to 60 grs. of the oily acid, carefully evaporated and dried a little below 212°. The dried salt weighed 65.5 grs.; on treatment with alcohol of 0.833 spec. grav., 3.4 grs. carbonate of soda remain undissolved, so that the quantity of valerianate of soda formed amounted to 62.1 grs.; consequently the 60 grs. of the oily acid contained 46.63 grs. acid and 13.37 grs. water, or 77.718 per cent. acid and 22.282 water, consequently 1 equiv. acid to 3 equiv. water.

Valerianate of Quinine.—1 part of oily valerianic acid is dissolved in 60 parts water, and 3 parts of pure (recently precipitated is best) quinine added, heated nearly to boiling, filtered while hot, and then placed in a cold situation. The crystals which have separated in the course of a few days are removed, and the liquid concentrated at a temperature below 122°. About 5 parts of the salt are obtained.

The aqueous solution of the acid dissolves the quinine with great readiness to the amount of 2 equiv. If, during the concentration, the temperature exceed 122°, oily patches are formed, which solidify on cooling to amorphous resinous masses, contain less water than the crystallized salt, and are scarcely soluble in water. The salt crystallizes in colourless rhomboidal tablets, with a slight mother-of-pearl lustre, or in white opake radiately-grouped needles, has a faint odour of valerianic acid and a very bitter taste. It is not altered by exposure to the air, becomes tenacious when heated, melts to a colourless liquid, and is then converted into the above-described hydrate. When heated more strongly, it gives off white vapours, takes fire and burns without leaving any residue. It dissolves in 110 parts cold, 40 parts boiling water; in 6 parts cold, and in equal parts of boiling alcohol of 0.863 spec. grav.; likewise in æther. All its solutions have a neutral reaction. The amorphous hydrate scarcely dissolves in 1000 parts water; it however imparts to it a bitter taste. In alcohol and æther it dissolves just as easily as the crystallized salt. 20 grs. of the crystals dissolved in water gave, on treatment with a solution of caustic soda, 10.84 hydrate of quinine = 10.271 quinine. The alkaline solution was saturated with carbonic acid, and evaporated to dryness. From this residue alcohol of 0.833 spec. grav. dissolved out 4.0 grs. valerianate of soda. The composition of the salt is therefore—

	Found.	Equiv.	Calculated.
Quinine	51.355	2	51.411
Valerianic acid	14.980	1	14.719
Water	33.665	24	33.870

The resinous body separated by boiling the aqueous solution was reduced to a fine powder and dried at a gentle heat. Treated in the above manner, the salt gave—

Quinine	71.855	2	71.629
Valerianic acid	20.225	1	20.505
Water	7920	4	6.860

According to the Prince of Canino, the quinine salt consists of equal equivalents; he has, however, taken Regnault's atomic weight of quinine, which is just as high again. The quantities, however, found by him are, according to the author, far too low.

Valerianate of the Peroxide of Iron.—60 parts of water are added to 5 parts oily valerianic acid and saturated with carbonate of soda, the solution boiled to expel all the carbonic acid, and left to cool. 3 parts perchloride of iron ($Fe^{2} Cl^{3} + 6HO$) are then dissolved in 100 parts water, and the cold solution of valerianate of soda added to it until no further turbidness results. The precipitate is washed with a little water, and dried at a temperature not exceeding 68°; at a higher temperature it loses a part of its acid, and on boiling the whole of it goes off. The salt forms a dark tile-red, loose, amorphous powder, which has a faint odour and taste of valerianic acid. Heated slowly, it parts without melting with the whole of its acid; heated rapidly, it fuses, and the acid is volatilized in thick inflammable vapours; but in this operation it undergoes decomposition, for the vapours smell of butyric acid; the residue consists of pure peroxide of iron. It is not moistened by cold water; boiling water gradually extracts all the acid, and leaves behind pure hydrate of peroxide of iron. The salt dissolves readily in hydrochloric acid; the dilute solution is not rendered blue by ferrocyanide of potassium; the peroxide of iron is consequently not reduced to protoxide by the valerianic acid. 20 grs. of the salt boiled with a solution of 10 grs. anhydrous carbonate of soda gave 5.40 grs. peroxide of iron and 18.95 valerianate of soda; therefore in 100 parts—

Peroxide of iron	27.00	3	26.315
Valerianic acid	71.00	7	71.720
Water	2.00	2	1.965

From this we may construct the formula $3Fe^{2} O^{3} + 7\overline{V}a + 2HO$, or $7\,(Fe^{2}O^{3} + 3\overline{V}a) + 2\,(Fe^{2}\,{}^{3}O + 3HO.)$ The atomic weight is 11400 or 34200. The precipitate is consequently a basic salt; the 2 equiv. acid wanted to produce a neutral salt are replaced by 2 equiv. water.

Valerianate of Zinc.—1 part oily valerianic acid is dissolved in 180 parts water, and to the solution ½ part of recently-precipitated carbonate of zinc added; the whole is then digested for some hours at a very gentle heat, filtered after cooling, and concentrated at a very gentle heat. The salt separates on the surface in white snow-like aggregations. If the ley be boiled, a portion of the salt adheres firmly to the bottom of the vessel. It crystallizes in snow-white, extremely light laminæ, with a mother-of-pearl lustre, similar to boracic acid, is not altered by exposure to the air, has a faint odour of the acid, and an astringent metallic taste, at the same time resembling that of valerianic acid. When heated on platinum foil, it melts, disengages thick white vapours, then takes fire, burning with a bluish flame, and finally leaves pure oxide of zinc, of which however a portion is volatilized during the combustion, owing to a partial reduction. It dissolves at the ordinary temperature in 160 parts water and in 60 parts alcohol of 0.833 spec. grav. The solutions have an acid reaction, become turbid on the application of heat, but become again clear on cooling. Cold æther takes up only 1-500th; boiling, on the contrary, 1-20th of the salt.

The analysis was executed precisely in the same manner as that of the valerianate of iron. 20 grs. yielded 5.9 grs. oxide of zinc and 14 grs. valerianic acid; consequently in 100 parts—

Oxide of zinc	29.50	1	30.08
Valerianic acid	70.00	1	69.92

The atomic weight is 1672. The salt contains no water.

Chem. Gaz. from. Buch. Rep.

ART. LVII.—ON A NEW METHOD OF PREPARING CHLORATE OF SODA AND CHLORATE OF BARYTES.

By Dr. C. G. Wittstein.

When carbonate of soda is treated with chlorine, the chlorate of soda formed cannot be separated by crystallization from the chloride of sodium in the same manner as with the corresponding potash compound, both salts being soluble in nearly equal proportion in water. Nor can their separation be well effected by spirit, since 1 part of the chlorate of soda requires for solution 34 of alcohol, while 1 part chloride of sodium requires 260. When 1 equiv. chloride of sodium is mixed with 6 equiv. lime, and chlorine passed through, not a trace of chlorate of soda is obtained, but the chloric acid generated remains in combination with the lime. The usual method of preparing the chlorate of soda is to mix chlorate of potash with bitartrate of soda, separating the bitartrate of potash by filtration and crystallizing the solution. The chlorate of soda, however, so obtained contains tartrates, as may be seen by its becoming black when heated. As these methods of preparation are by no means advantageous, the author advises the following plan:—3 parts of crystallized sulphate of ammonia and 3 parts of chlorate of potash are dissolved in a porcelain dish in 15 parts hot water, and evaporated over the water-bath to the consistence of a thin paste, being constantly agitated. This paste is then conveyed into a glass flask, 4 times its weight of alcohol of 0.833 spec. grav. poured over it, digested for a day at a gentle heat, filtered, and the residuous saline mass washed with spirit. A fourth part by weight in water is now added to the mixed fluids, the spirit distilled off, the residue diluted with an equal weight of water, 5 parts pulverized, crystallized carbonate of soda added, and when no more ammonia is disengaged, evaporated on the water bath to dryness. The salt obtained is dissolved in twice its weight of water and crystallized.

On mixing sulphate of ammonia and potash, sulphate of potash and chlorate of ammonia are formed, the former of which is not dissolved by the spirit. Since on careful evaporation of the aqueous mixture a small portion of the chlorate of ammonia is unavoidably decomposed, somewhat less carbonate of ammonia has been given in the above directions than required by theory. By the action of the carbonate of soda on the chlorate of ammonia, carbonate of soda is formed, and the residue is chlorate of soda.

In the same manner chlorate of barytes may be prepared with advantage, only in this case caustic barytes must be employed. A hot solution of barytes, prepared from crude materials (sulphuret of barium and oxide of copper, nitrate of barytes and iron-filings) answers very well; an excess of barytes does no harm, because it is converted into carbonate on evaporation; should, however, the residue still be alkaline, a current of carbonic acid may be passed through the solution.—*Ibid from Ibid.*

ART. LVIII.—ON AQUA REGIA; ON HYPOSULPHURIC ACID AS A MEANS OF OXIDATION; ON THE CONSTITUTION OF THE SAME ACID, AND THE PART IT ACTS ON BEING PUT IN CONTACT WITH ORGANIC SUBSTANCES.

By Dr. Kœne, Professor of Chemistry, at Brussels.

1. Aqua Regia may serve as one of the most powerful agents either for oxidising, acidulating, or dissolving a great number of simple and compound bodies. Important, however, as this substance is, on account of the above uses, and

interesting as are the phenomena attending its action, the nature of the same is still but incompletely known.

2. Berthollet attributes the properties of aqua regia to the formation of chlorine and nitrous acid.

3. This hypothesis was adopted by Sir H. Davy, who, after having mixed hydrochloric acid with nitrous acid, obtained a liquid, which did not possess the properties of aqua regia.

But in the days of Davy hyposulphuric acid was not known. The English chemist, therefore, may have operated with this acid, which seems the more likely, as several French chemists, at the instance of Professor Dumas, regard this acid as a compound radical, as an oxidising agent less powerful than nitric acid, capable of replacing hydrogen in some organic substances, which contain more than one equivalent of this metalloïd (hydrogen.)

4. Finally, Millon considers nitrous acid as the most powerful oxidizing agent of all the stages of oxidation of nitrogen—an hypothesis which leads to the assertion that the hydrogen of hydrochloric acid may destroy the nitrous acid, as the same metalloid may deoxidise nitric acid.

5. We have, therefore to ascertain whether hydrochloric acid reduces nitric acid to hyponitric acid, to nitrous acid, or to binoxide of nitrogen.

6. If it could be proved that nitrous acid, of all the three oxyacids of nitrogen, is the most powerful oxidising agent, we might give preference to the latter hypothesis. But, recollecting the observations made by Davy (3,) and considering the oxidising power of the hyponitric acid, the formation of which, by the reaction of oxide of nitrogen on nitric acid, precedes the production of nitrous acid, we arrive at the conclusion, that hydrochloric acid can reduce nitric acid only to the state of nitrous acid.

7. The constitution, however, of oxysulphuric and analogous acids leads us to suppose that hyposulphuric acid is a radical; but, on the other hand, the formation of hydrochloric and

nitric acids, by mixing water with a solution of chlorine in hyponitric acid, is rather in favour of the assertion, that aqua regia is the result of a *mutual action* between the elements of the hydracid and those of the oxyacid—$(H^2Cl^2)+(N^2O^4+O)=(H^2+O)+(N^2O^4+Cl^2.)$ According to which, therefore, water and oxychloro-nitric acid are formed, the latter of which is little stable, and, like analogous acids, is decomposed in the presence of water. The latter hypothesis having been preferred to the two others, it was contemplated to allow an excess of gaseous hydrochloric acid to act on concentrated nitric acid. But by the mutual action of the said acids water is formed, the quantity of this liquid, however, gradually augments and is opposed to the complete decomposition of the acids; wherefore, in order quantitatively to determine the hydrochloric acid, the elements of which combine with those of the nitric acid, it was necessary to protect the acids from the influence of water during the time of their mutual action—that is, to employ a liquid which combines with water the moment it is formed, taking care at the same time that this hygroscopical substance be of such a nature as not to exert any injurious influence on the reaction, by which the latter might be rendered incomplete.

8. Sulphuric acid may answer this purpose. This combination, *if present in great excess*, possesses, in addition to this, the property, at the temperature of the disengagement of chlorine, of retaining in solution the hyponitric acid and the nitrous acid, a property indispensable for the demonstration, as an excess of hydrochloric acid is necessary to replace the whole of the nitric acids employed, and this excess, therefore, must be determined.

9. This determination requires that the influence of the chlorine be rendered inefficient, the quantity of which in a free state, under these circumstances, cannot be determined, as the chlorine in its free state, before it can be completely disengaged, under the influence of heat, from its solution in

sulphuric acid, red vapours are formed. These vapours, on entering into an aqueous solution of chlorine, would reproduce hydrochloric acid and nitric acid.

10. In the present case, therefore, the hydrochloric acid must be determined by the process which I have communicated in another article.

After these preliminaries, I might pass on to the description of the apparatus I employed, the process adopted, and an infinity of precautions taken, in order accurately to determine the amount of hydrochloric acid, which was not acted upon by the nitric acid, the amount of real acid of which having been previously ascertained; the analyses, however, instituted with various quantities of substances have led to results disagreeing with the theory indicated; this description would, therefore, be useless. Although it is true that in similar analyses very considerable losses are unavoidable, it is nevertheless a fact, that if the loss amounts to more than half an equivalent of hydrochloric acid, the cause must be sought after, not in the complication of the apparatus, or of the analysis, but in some other circumstance.

11. As this cause may be supposed to be the deoxidation of the hyponitric acid induced by the action of the hydrochloric acid on it, five grammes of well-dried nitrate of lead were heated, and the vapours of hyponitric acid thus disengaged were directed into 100 grammes of pure and concentrated sulphuric acid. The gaseous hydrochloric acid gas was then passed into the acid liquid. A large quantity of chlorine was disengaged from a solution of sulphate of potassa (10.) To ascertain whether the nitric acid in its turn was decomposed by hydrochloric acid, the following experiment was made:—

12. Into a solution of 100 grammes of pure sulphuric acid, and 2.1 grammes of hyponitric acid, a current of hydrochloric acid was passed for half an hour, and afterwards by the application of heat the hydrochloric acid and chlo-

rine were expelled; half of this was then again treated with a current of hydrochloric acid, but this time no chlorine was produced. A portion of the other half was mixed with one-sixth of its volume of water freed from air. This water was introduced into a flask filled with carbonic acid.* The water was acidulated with the acid, and as soon as the flask became filled it was hermetically closed. On allowing the acid to cool, two drops of hydrochloric acid were added, the vessel was then closed and shaken. After half an hour the vessel was opened, when a distinct odour of chlorine was perceived.

In this experiment, care must be taken, 1st, that the acid be added to the water, that, immediately on the addition, nitric acid may be produced; 2d, that about six parts of acid to one of water be contained in the flask, to prevent an excess of water from counterbalancing the action of the hydrochloric acid on the nitric acid, at the moment of its formation (7.)

13. The sulphuric acid previously employed in the concentration of nitric acid was heated until it arrived at a constant boiling point. The acid, on being treated as above, with water and hydrochloric acid, exhibited the same phenomena, but by an addition of hydrochloric acid alone chlorine was never formed.

14. To 150 grammes of the concentrated sulphuric acid of experiment 13, 10 grammes of red nitric acid were added. By this solution, the latter lost its intense red colour; however, on heating the acid mixture in a retort, the neck of which was drawn out, and bent into a rectangle, the red vapours disappeared. Between 338 and 356° F. an effervescence took place, which seems chiefly to be derived from a disengagement of oxygen. At 374° F. the disengagement of gas became so powerful that the liquid seemed to boil; but at higher temperatures the formation of oxygen con-

---

*The non-existence of sulphate of oxide of nitrogen not being ascertained, it was necessary to take the above precaution.

siderably diminished, and at 482° F. it ceased entirely to be disengaged. Together with the oxygen, red nitric acid was distilled over, amounting almost to one-third of the sulphuric acid added.

The moment the temperature of the acid was found to be 620° F., the neck of the retort was introduced into a vessel in which carbonic acid was continually disengaged, and the flame of the spirit lamp was gradually diminished. The acid, which, when boiling, was of an intense yellow, after cooling became completely colourless.

15. Cooled down to the common temperature, the acid formed no chlorine with hydrochloric acid.

Being treated with water, as in experiments 12 and 13, on an addition of hydrochloric acid, the acid gave chlorine.

Another portion of the acid being mixed with alcohol, the air being excluded, formed nitric ether.

Copper dissolved in it, with a violet colour, and a disengagement of binoxide of nitrogen.

After having adapted to the tubulure of the retort, a funnel provided with a stop-cock, through this were first introduced carbonic acid, and then 26 grammes of acid. Heat was afterwards applied, and when the water was boiling the cock was opened. The temperature of the water was considerably raised by the addition of the acid. At the same time, red vapours were disengaged, and received into water with carbonate of lime suspended in it; heat was then applied until the temperature of the acid arrived at the boiling point of sulphuric acid. The liquid separated from the carbonate of lime was evaporated to dryness, and the residue was exhausted with alcohol. The alcoholic liquid, on being evaporated, in its turn, gave a residue, which, on calculation, left 0.21 grammes of lime.

These facts being established, we mean to apply them to aqua regia and hyposulphuric acid, in order more fully to ascertain the nature of these liquids.

ON THE NATURE OF AQUA REGIA.

16. Aqua regia is very peculiar in its characters and functions. Its formation is especially influenced by the temperature, by the degree of concentration of the two acids from which it is formed, and by the presence of a body capable of combining with chlorine.

17. By mixing hydrochloric with nitric acid, both being concentrated, and the temperature very low, no reaction is caused. The cold liquids are mixed without colouration or disengagement of chlorine. If, however, the mixture is removed from the refrigerating medium, and put in a place in which the temperature is 32° F., it gradually becomes coloured, and chlorine is disengaged.

18. A mixture of two volumes of hydrochloric acid of 37.60 per cent., and one volume red nitric acid, forms chlorine only at a temperature above 9° F. Nitric acid, containing 74.5 per cent. of real acid, being treated with the same hydrochloric acid, is coloured, and forms chlorine, at a temperature above 21° F.

The presence of a greater amount of water may still further retard the reaction. Finally, if the acids be very much diluted, even by the application of heat, no reaction is caused; if, however, in the latter case, a metal be thrown into the liquid, a reaction follows, and water is formed. Soon afterwards, this liquid diminishes the affinities to such an extent, that the reaction would entirely cease, if a metal of the sixth class—for instance, gold—were made use of.

19. These phenomena prove that the formation of aqua regia is by no means the effect of the mutual reaction between the elements of hydrochloric and nitric acids (the latter being considered as composed of $N^2O^4 + O$,) but that it is to be attributed to the action of the hydrogen of the one upon the oxygen of the other. To produce the effect, it is ndeed requisite that, either by the application of heat, or the use of a body having great affinity for chlorine, or these

two agents jointly, the affinity of the chlorine for the hydrogen of the hydrochloric acid be reduced, and that the affinity of the same metalloïd for the hydrogen of the water be counterbalanced, to augment the dishydrating power of nitric acid. *If a double affinity predominated in this reaction* (7,) *these phenomena would not be perceived, the chlorine would not be disengaged, or enter into a combination, the moment of its formation, to combine with the hyponitric acid.*

In making these remarks, we have not lost sight of the various circumstances in which a chemical action commences, the moment the affinities by which it was called forth are annihilated. We even have premised the hypothesis by which hyponitric acid is considered as a radical. We attempted to support the hypothesis, by allowing hydrochloric acid gas to act upon concentrated nitric acid, at a low temperature, protecting it at the same time against the influence of water. Instead, however, of obtaining the combination ($N^2O^4 + Cl^2$,) we perceived, and demonstrated, that these acids were reduced to water, chlorine, and nitrous acid (11, 12, 14.) These are the products furnished by an active aqua regia.

The causes by which these are produced may be, 1st, the striving of the chlorine to pass into the gaseous state, or to combine with metals; 2d, the instability of the nitric acid and its dishydrating power; 3d, the tendency of nitric acid for becoming volatilised or forming combinations.*

---

*M. Baudrimont says that, by putting together hydrochloric acid of commerce and nitric acid of 86° C., he obtained a gas of a peculiar nature. This gas, which he considers as the active principle of aqua regia, would be that which corresponds to nitric acid, and be represented by the formula $N^2O^3C^2$. I know not whether M. Baudrimont, in asserting this, was not influenced by the hypothesis of Mr. E. Davy, according to which the product obtained by the action of nitric acid on fused sea-salt, would be the active principle of aqua regia.

Certain it is, that if the chloronitric acid exists, it must be possessed of peculiar properties, among others—to yield nitrous acid to sulphuric

ON HYPONITRIC ACID CONSIDERED AS AN OXIDISING AGENT.

20. We have just seen that the action of hydrochloric acid upon nitric acid becomes embarrassed as soon as the latter is reduced to the stage of nitrous acid. This is manifestly owing to the circumstance that the oxygen is in a more intimate state of combination in the latter acid, than in nitric and hyponitric acids. Nitrous acid is, therefore, the most stable, and, consequently, of the three stages of oxidation of nitrogen, the least powerful oxidating agent.

This inference, drawn from the reaction between hydrochloric, nitric, and hyponitric acids placed in concentrated sulphuric acid, is far from coinciding with that which Millon concluded from his experiments. According to this chemist the process of oxidation by nitric acid is in general the following:—nitrous acid is formed first, and with this nitrite of copper, mercury, silver, &c., produced; these salts are again destroyed by the nitric acid, and this destruction giving rise to the formation of oxide of nitrogen, the latter body on coming into contact with the nitric acid reforms the nitrous acid, the metal is then attacked again by this acid, and the salt formed destroyed, and so on in succession.

---

acid (*vide* the details of my experiments;) *not to combine with the elements of water;* but to furnish nitrates and chlorides with the metalloïds; to attack gold, and to explode with silver reduced to powder; to act, *but slowly*, however, *on potassium;* with the powder of antimony or arsenic to produce intense phenomena of light and heat, *without producing similar phenomena with fused phosphorus* (*Annalen der Chemie und Pharmacie*, xlviii. p. 202, and *Traité de Chimie Générale, &c.*, par A. Baudrimont, i. p. 616.)

If the French chemist, instead of having employed the raw products of commerce, had operated with dry hydrochloric acid, and if he had taken care to dry the chloronitrous gas, and to ascertain the absence of hydrochloric acid, it might have been possible to form an opinion on the merits of his work, the data of which require more minute researches.

We know not, whether in the action of the metal on the nitric acid, the formation of a nitrite always precedes that of a nitrate; but it does not appear to me that the production of a nitrite by the action of an alkali on a saturated solution of oxide of nitrogen in nitric acid, permits us to accede to the hypothesis of M. Millon, because the formation of hyponitric acid precedes that of nitric acid, and because, if the nitric acid, as is generally the case, be present in excess, only hyponitric acid is formed. Nor do I conceive how nitrous acid, one of the most powerful oxidising agents, can combine with protoxide of mercury. The presence of nitrite of protoxide of mercury, the circumstances attending its formation, the property of the phosphorous acid to resist the oxidising power of the nitrous acid, the formation of nitrous acid by the action of hydrochloric gas on nitric acid and hyponitric acid; the production of hyponitric acid by the action of oxide of nitrogen on an excess of nitric acid, the circumstances attending the formation of nitrite of oxide of ethyl, and the influence of heat on alkaline nitrates are all facts wholly incompatible with the hypothesis of M. Millon; and the important observations made by the author himself, prove to evidence, that of all the stages of oxidation of nitrogen the hyponitric acid is the most powerful oxidising agent.

If the reverse were the case, if the hyponitric acid were a less powerful oxidising agent than the nitrous acid, an anomaly would occur in the oxidising powers of these stages, for the greater the amount of oxygen they contain, the more powerful oxidising agents they are. In a manner, that oxide of nitrogen, which, in the presence of iron, zinc, or phosphuretted hydrogen, is converted into protoxide of nitrogen, resists the deoxidising power of copper. Nitrous acid, which yields one-third of its oxygen to copper, in the presence of phosphorus and hydrochloric acids, undergoes no change, though either of them may convert the hyponitric acid into nitrous acid. With reference to the nitric acid, it appears, beyond doubt, to be a stronger oxidising agent than hyponitric acid, if it could only exist by itself.

Chemist, from Annalen der Physik und Chemie.

ART. LIX.—NOTE ON SANTONIN OR SANTONIC ACID.

By H. Gualtier De Claubry.

Being at Venice a short time ago, Professor Zantedeschi communicated to me the results of a curious experiment which he made on santonine, and which was opposed to those which different chemists have obtained, with several organic colouring matters, and in particular those of Professor Bizio on the purple of the ancients.

It is known that indigo and orcine, for example, are colourless, and take the brilliant tint which characterises them only by the absorption of oxygen; other analogous facts appear to lead to the general result that many colouring matters present the same character.

It is known that santonin, exposed to the action of the solar light, speedily acquires a yellow colour; but is oxygen in this case the principle which actuates this change? According to the experiments of Professor Zantedeschi, this does not appear to be the case. If santonin be exposed to isolation in the barometric vacuum, it acquires a yellow tint almost as bright, and nearly in the same time, although rather less rapidly, as another portion of the same substance, placed under the same luminous influence in the air or in oxygen. Professor Zantedeschi concludes from this that the colouration is due to a peculiar action of light.

Without adopting this conclusion, which could only be the result of numerous experiments, it may be well to call to mind a very old experiment of Dr. Vögel, sen., in which phosphorus, exposed to complete isolation in hydrogen gas or *in vacuô* was converted into a red body analogous to the oxide of this body.

Ibid, from Journ de Pharm.

ART. LX.—RESINÉONE OF TAR A THERAPEUTICAL AGENT.

By Dr. Péraire.

Dr. Péraire, knowing long ago that tar is an efficacious therapeutical agent, but that owing to its being disliked by most patients, it acquired only little reputation in medicine, he contrived to separate from this body, so disagreeable in taste and odour, the active matter, which may easily be employed. The important researches of M. Frémy (*Ann. de Chimie et de Physiq.* vol. lix.) paved the way for M. Péraire. This distinguished physician, however, experimented with the tar itself, and not with the resin. The process which he adopled is as follows:—

It is known that on distilling tar, either with water or unmixed, an oil is obtained, which is called *oil of cade.* M. Péraire subjected this product to a fresh distillation, and the results were nearly the same which M. Frémy obtained from the resin.

Previous to commencing the operation, a fragment of potassa is put into the oil of cade, to saturate any acids present. On placing the mixture in a retort, and applying heat, it behaves in the following manner:—Like the resin, the tar boils at 158° F., and on distillation a colourless oil passes over, which is the *résinéone;* by raising the heat to 297½° F., *résinéone* is obtained in a more abundant quantity; and at 482° F., *résinéine* is obtained. If at each period of the operation the receivers were exchanged, the three products of tar may be separately collected.

Dr. Péraire subjected these three substances to chemical experiments. He found that résinéone has precisely the same properties as the tar, and that the healing art ought to have recourse only to the colourless oil, substituting it for the impure matter; résinéone and résinéine seemed to be much less active.

The recently prepared résinéone of tar is a liquid, colourless, essential oil; of a penetrating odour. Placed on the tongue, it provokes a sense of heat, and an acrid taste. Shortly after, this sensation disappears, and a balsamic odour is perceived, of an agreeable nature. The résinéone is endowed with all the properties of essential oils; it is inflammable, soluble in ether. By distilling five parts of résinéone with 100 of alcohol, an alcoholate is formed. By mixing these two substances in a cold state, the same product is rapidly obtained; the preference is to be given to the latter process. By this means it is easily determined quantitatively. The protracted influence of light imparts to résinéone a slight yellowish tint. By mixing 995 parts of sugar with 5 parts of résinéone, a saccharate is formed, containing ½ per cent. of résinéone. This saccharate is given three or four times a day, in doses of a spoonsful, with a cupful of an infusion. It is employed with advantage in catarrhs of the lungs, chronic bronchites, and bronchorrhœa.

The saccharate may likewise be administered in the form of a looch, in the following manner:—

White looch of the Pharmacop. (French)	125 parts.
Saccharate of résinéone - - -	30 do.

Five parts of résinéone mixed with 995 parts of oil of sweet almonds formed an oleate; in this form the résinéone easily enters into the composition of loochs. 15 parts of it are given with 125 parts of a potion.

By mixing 990 parts of sugar with 5 parts of résinéone, and 5 parts of gum, a mixture is obtained, well qualified for pastilles.

The alcoholate of résinéone, containing ½ per cent. of résinéone, is to be taken on sugar, at the doses of six drops four times a day. It is recommended in chronic catarrhs of the bladder.

Externally the résinéone seems to have rendered remarkable services in cutaneous diseases.

A pomatum may be formed of it in the following manner:—

Ceratum, without water - -	30 parts.
Résinéone - - - - -	4 do.

Mix.

M. Péraire has applied this mixture with success in several cases, which are commonly called dartres (tetter.) (*Gazette Médicale de Paris,* 14th Dec., 1844.)

We think that with reference to cutaneous diseases, M. Péraire could have employed the résinêone with more advantage in the *squammous affections,* viz., in psoriasis, ichtyosis, prurigo, &c., than in cases of dartres (tetter,) or with a humid secretion. At least, tar was hitherto employed with more success in those affections, than in cases of dartres.

Ibid from Journ. de Pharm. et de Chim.

ART. LXI.—NATURAL HISTORY.—Extract of a work upon Singapore, addressed to M. De Lagrenér, Minister Plenipotentiary, residing in China, by DR. YVAN, Physician of the Legation, and Professor in the Secondary School of Medicine, Marseilles.

Manilla, Aug. 1st, 1844.

The Chinese are the only inhabitants of Singapore engaged in the fabrication of the substance known in commerce under the name of *Gambir* and *terra japonica*, as also the cultivation of the shrub producing it. Of this culture and manufacture I am about to give a brief description. The gambir, *nauclea-gambier*, of which I do not give a botanical notice, (it being found in all botanical works) is a bush of the family *rubiacées*, attaining to 8 or 10 feet in height. Its flexible branches spread out fully and occupy a considerable space; they are slender, and laden with leaves that afford but slight shade, and are easily penetrated by the sun's rays. Sometimes the Chinese sow the seeds of this bush to obtain the plants necessary for them; at other times, and it is the method more generally adopted, they are satisfied to plant in the soil, slips taken from existing plantations. For this they prepare the ground beforehand by pulling up all the plants that might hinder the development of that which they would propagate; an interval of three or four feet is allowed between two stalks of *nauclea*. This done, they abandon the plantation to itself; the only attention it receives afterwards, is several months later, in ridding the plants of the parasites which have seized upon them. At the fourteenth or sixteenth month the bushes have attained their full development, and the first collection of leaves may be made with which to prepare the extract known under the name of gambir. This is done in the most simple manner: a furnace of the largest size, a cast iron or copper kettle, rigged up under a shed, are the only two indispensable objects for this operation. The kettle is filled up with water and the leaves of the *nauclea* heated, and ebullition sustained, until the leaves are completely softened and decolourized by the coction. The leaves are then lifted up with a fork and placed upon a piece of wood, hollowed so as to form a spout, and so disposed that the water with which the leaves are impregnated, drips little by little, and runs again into the kettle.

If the decoction is not sufficiently charged with the active principle, new leaves are added; but if sufficiently charged, it is concentrated to the form of an extract.

The point of concentration attained, the extract is run into a kind of cake, having raised edges, and cut into pieces of about the same size. If intended to be sold to the people of the place, and especially the Malays, who mix it with lime and areca nut, adding to these ingredients the betel leaf, which they chew constantly, it is divided into pieces of three *centimetres* wide, by fourteen long and four to five in thickness.

As fast as these divisions are separated from the principal mass they are carried upon palm mats to be dried in the sun, and receive a rapid desiccation.

Gambir, before being completely dry, is of yellow colour, not very deep; it offers but slight resistance, and is easily crushed between the fingers without adhering by the effect of pressure. As soon as it begins to dry, it blackens upon the surface and assumes an inward deep brown colour. The merchants of Singapore designate this substance under the name of *catheu; terra japonica* and *gambir* being more particularly given to it by the Malays: for the first, *cachou* and *gambir* are an absolutely identical substance, though the product of different countries and vegetables. It is true that the extract of the leaves of the *nauclea gambier* resembles the catechu extract of the *acacia C.*, as also the gum kino; but these three substances are far from being identical.

* * * *

What seemed to me actually demonstrated, is the fact, that in no country is the substance known as gum kino, produced by the *nauclea gambier;* the name of gum of gambir, which the merchants sometimes give it, is alone the cause of the error into which the authors of works upon Materia Medica have fallen in this respect.

The Chinese and the Malays attribute to the extract of the *nauclea* great medicinal properties: they employ it with decided success in cases of chronic dysentery. Under these debilitating climates, the astringent properties it possesses are eminently suited to impart to the organs a tonic action, which restores their functions. It is not, however, by reason of its medicinal properties, that the culture of gambir since several years has taken so wide an extension at Singapore. From a time immemorial this extract has been employed in China for the tanning of leather; and the English, so prompt to seize upon the industrial processes of successful application in other parts of the world, have not been behindhand in appreciating the tanning properties of a substance, the power of which is not to be compared with any other astringent substance. With this view immense quantities are exported to England.

* * *

This shrub is well adapted to skirts of woods, arid places and rising grounds; it requires neither manure nor any improvement, contenting itself with a light soil, and exacts little or no labour in its cultivation.

All the gambir plantations are at a distance from the town of Singapore, and in the neighbourhood of pepper plantations. The boiled leaves of the *nauclea* serve as an excellent manure for the branchy plant furnishing the black pepper, and the culture of the two can be well conducted together.

Whilst sojourning a length of time amidst the Malay population, I naturally sought to become acquainted with the preparation to which these people submit their *kreïs*, which pass for murderous weapons, imparting mor a wounds. A Malay, in whom I had full confidence, and who enjoyed a certain reputation among his countrymen, showed me the process generally made use of, to render their arms poisonous. They first scour the blade of the instrument with quick-lime, then sprinkle upon one of its sides arsenious acid in impalpable powder, and upon this part pour lemon juice. After this first operation they allow it to remain for a length of time until they suppose all reaction has ceased. When they perceive that the lemon juice is almost wholly absorbed, they delicately wipe the surface upon which they have been operating, and coat it with the concentrated juice of a root which I believe to be the *menispermum cocculus.* They then operate in the same manner upon the other side of the kreïs, and lastly cover the instrument with a small quantity of oil of cocoa. These arms do not preserve for a long time their poisonous properties; I have seen a small sized dog, stabbed with one of these newly prepared instruments, die in the space of an hour, exhibiting all the signs of death by a narcotic poison; whilst persons to whom I have been called to attend, wounded with instruments that had been poisoned several years previous, experienced no other inconvenience than usually attends slight wounds from a sharp instrument. In cases of sickness, the Malays of Singapore never have recourse to European physicians. There exists among them certain professors of the healing art who possess their confidence, and who in their eyes have traditional secrets upon the knowledge and treatment of diseases, in vain to be sought elsewhere. One of these men affirmed to me that he had in his possession medical works that had been transmitted by his forefathers the Malays; but these pretended works on medicine are mere collections of receipts, more or less whimsical and extravagant, which have been bequeathed to them by the Arabs, from whom they hold all that constitutes social individuality, viz.: religion, customs, and industrial arts. I convinced myself that the Malay doctors do not practice bleeding in any case, whatever.

I have, however, found these Malays in possession of a plant which can be of use as an efficient remedy, and with which English therapeutics is already made acquainted; this is the *menispermum verrucosum*, employed by them as an anti-periodic.

There is found in the Singapore market a substance of exceeding high price and which deserves to draw attention: this is the camphor known under the names of Malay camphor and *capur-barus*. It is exhibited under the form of white crystalline bodies, composed of pieces none of which exceed the size of the thumb nail, and they present a rectangular form. Each piece seems formed like crystals of small similar particles, the one united to the other. It is certainly a natural product, being found in a concrete state in certain parts of the tree which produces it, and is not made to undergo the least preparation. The proofs in support of this opinion are furnished by the evidence of the natives of Borneo and Sumatra, where it is collected, and furthermore by certain characters of which I shall speak. The near transparency of this body, and its hardness compared to that of refined camphor, satisfy us that it is formed with extreme slowness; its lamellar form and micaceous appearance prove, on another side, that it is not consolidated in the open air, but that its crystallization is effected within a very confined space.

Some authors suppose that this camphor, which is produced by the *dryabalanos camphora*, or *shorea robusta*, runs from incisions made upon the branches and trunk of this tree. But this opinion is inadmissible when you take into consideration the extreme volatility of this substance, so that those who consider it to be under the bark of the tree or more likely to be found in its roots, are, in my view, most correct. Its excessive price, notwithstanding, explains nothing. It is well known that a large quantity of camphor imported into Europe comes from China, and it is precisely for this latter country that all the Malay camphor collected in Borneo and Sumatra is bought, where the Chinese pay for it per pound the price they sell their own camphor per quintal.

For this reason I do not think the least quantity has ever been exported to France. Does the high price attached to it come from its purity as compared with crude camphor? If this could be supposed, the Chinese would better appreciate our refined camphors, which have a much finer appearance but which they refuse to purchase when offered to them. Have the Chinese doctors, as has been vulgarly said, discovered certain medicinal properties in the Malay camphor which does not exist in that produced by the *laurus camphora?* It is hardly probable. The *capur-barus* does not seem to differ sensibly from ordinary camphor. It is more compact, it is true, perhaps of greater specific gravity and less volatility; but all its characters connected with molecular arrangement are insufficient to attribute to it special properties. However, it has appeared worth while to the Minister Plenipotentiary in China to select some of our countrymen to prove, by direct analytic experiment, the difference that may exist between this camphor and the camphor employed in Europe, for which purpose we have provided ourselves with a number of specimens of this substance. From what I have seen, the Chinese and Malays of Singapore and Malacca employ the *capur-barus* for frictions upon the eyelids, by passing over these parts a piece with as large a surface as possible, which explains why this camphor sells proportionally dear as its fragments are large or small. These frictions procure a momentary coolness, extremely agreeable; and when the eye is fatigued with too much light, or prolonged exercise, it has the immediate effect of restoring its precision and clearness. The refined camphor of Europe employed in the same case, if my personal experience is to be relied on, has not this calming property. A. D.

ART. LXII.—EXPLOSION PRODUCED BY THE COMBUSTION OF POTASSIUM.

Mr. DUVIVIER, Pharmacien, observes as follows:—

Reading in the Journals the accident which happened some time ago to Mr. Malagutti, Professor of Chemistry, attached to the Faculty of Sciences of Rennes, who, in trying the reaction of Potassium upon a new organic substance, had his left hand lacerated by the glass broken in the explosion of a tube with which he was operating, brings to mind an accident which happened to me some years ago.

I had thrown upon water a small ball of potassium; it inflamed immediately and burnt, ploughing up the surface of the liquid. When, by the combustion, the little ball was somewhat reduced in volume, all at once an explosion took place, throwing in different directions particles of the flaming potassium, one of which struck the forehead of a person standing near, occasioning a slight eschar. I was the more surprised at this phenomenon, as I had on various occasions previous to the accident placed potassium in contact with water, which burnt to its complete conversion into potash without exploding. I do not pretend to explain a phenomenon of this nature, or give any positive theory respecting it, but I have sought to account for this peculiarity, and with this object have reflected upon all the circumstances which might concur in the production of this phenomenon. The potassium I employed had been wiped with bibulous paper to get rid of the naptha in which it had been preserved; its surface was slightly coated with oxide. I do not suppose that this particular state of the potassium could in any wise favour the production of this phenomenon. Allowing that the potassium had retained a small quantity of naptha, that the hydrogen of this carburet in combining with the oxygen of the air at the same time that its carbon in the state of carbonic acid united to the oxide of potassium, and that these reactions had determined the explosion, which is hardly probable, they would have been manifested at the commencement of the combustion; but not so, when the explosion happened, the principal part of the potassium had been converted into potash, and only towards the close of the experiment did the explosion occur.—On the other side, it is known with what energy potassium decomposes water, of which the hydrogen at an elevated temperature resulting from chemical combination inflames by contact with the atmospheric oxygen. Can we not suppose, that the capricious influence of the electric forces under peculiar circumstances may bring about the moment when the double combustion of the potassium and the nascent hydrogen can no longer operate in a normal manner and hence cause an explosion?—However, it will be seen from this, that in experimenting with potassium, whether in acting upon substances having for their constituents the elements of water, or burning it upon this liquid, it is always prudent to avoid the dangers of an explosion.—*Journ. de Chim. Med.*

ART. LXIII.—ON A NEW KIND OF ADULTERATION OF THE MURIATIC ACID OF COMMERCE.

By Dr. A. Vogel, Jun.

The contaminations of muriatic acid hitherto known, mostly originating from the sulphuric acid employed in the decomposition of common salt, consist for the greatest part of sulphurous, sulphuric, and nitric acids, chlorine, the chlorides of arsenic, tin, iron, and probably of selenium also, if the acid of Nordhausen be made use of in the decomposition. I lately received an acid of commerce, which, besides traces of chlorine and iron, contained none of the above impurities;

being, therefore, considered pure enough, it was employed in some qualitative analyses. On directing, however, the practical chemical manipulations, I had frequent occasion to remark that, from completely pure metallic salts, the acidulated solutions of salts which are not precipitated by sulphuretted hydrogen, yet on being acidulated with the above muriatic acid, a black precipitate was invariably thrown down. This observation naturally raised the suspicion, that the hydrochloric acid contained a body causing the said precipitate; I, therefore, examined the acid more minutely. Several experiments showed, that the hydrochloric acid contained chloride of lead, in no inconsiderable quantities. The precipitate thrown down by sulphuretted hydrogen which was brown-red at first, and on employing an excess of the latter body turned black, was sulphuret of lead. On diluting the acid with water, small shining leaflets of chloride of lead, were gradually deposited, owing to the greater solubility of this salt in the concentrated acid than in water. The crystals easily fuse before the blowpipe, and on being calcined with soda, the metallic lead is reduced; and by being moistened with hydrosulphate of ammonia they become black. With sulphuric acid a white precipitate is thrown down in the acid. Potassa and ammonia throw down a precipitate, which on account of the traces of iron admixed is somewhat yellowish.

To determine the amount of chloride of lead contained in the acid, one ounce of the same was slowly evaporated to dryness. The dry residue weighed 4.75 grammes, which corresponds nearly to 1 per cent.

The presence of chloride of lead in hydrochloric acid, may easily be accounted for, since, in some manufactures, as is known, the decomposition of common salt, and the distillation of the acid is effected in leaden vessels.

Very distinct crystals of chloride of lead may be obtained by evaporating the acid to one-third of its volume, when, on cooling, this salt is deposited in large quantities. Hydrochloric acid, which contains so much lead, is, of course not fit to be employed in chemical experiments. By distillation, however, the acid may be completely freed from that impurity. No trace of lead is met with in the first receiver.

Chemist, from Buch. Rep.

ART. LXIV.—ON A MOLECULAR MODIFICATION OF OIL OF TURPENTINE, RENDERING IT CAPABLE OF MORE READILY DISSOLVING CAOUTCHOUC.

By M. Bouchardat.

Ten years ago, I was consulted by a manufacturer of water-proof cloth, to discover the best solvent for caoutchouc. At that time, the practice in England was to employ coal-tar naptha, or an oil obtained by the distillation of caoutchouc over a naked fire.

I commenced by carefully examining this pyrogenous oil. I separated from it several well-defined hydro-carbons, remarkable for their low boiling point, but I soon found that the price of this oil would long prevent its use in manufactures. The essential oil from coal has so disgusting and permanent a smell, that I resolved to seek for another solvent.

From the first, I thought that turpentine, which, as is well known, dissolves caoutchouc, might be so modified by heat as to supply the solvent we required, and experience proved the truth of this supposition. By distilling oil of turpentine once or twice over a naked fire, we obtain a very satisfactory solvent. In making this distillation on brick, the essence being submitted to a higher temperature, it becomes very little inferior to caoutchouc. This is now the solvent for caoutchouc, employed both in France and England, for the manufacture of impermeable textures. What change has this process effected in the turpentine? Does it form new volatile products, or is it simply a modification of the molecular constitution of the oil? We can now answer these questions.

The physical properties of the oil distilled on brick are as follow:—The colour is slightly yellow, its odour that of a mixture of thyme, naptha, and turpentine. It is more limpid than the essence from which it is formed, the density of the former being, 0.8736, and after distillation, 0.8420. It begins to boil at 85° C., but the temperature immediately rises to 154°, and remains at this point nearly stationary. I have tried to isolate the more volatile part of the distillate, but without success. The unchanged oil boils at 151° to 158°, whilst the distilled boils at 150°. I analysed the modified oil, and found its composition precisely the same as the original. The nature of the modification in question being still obscure, during the last winter I employed the apparatus for polarization belonging to the Hôtel Dieu, to pursue the inquiry, and I found that by its means I was able to perceive the molecular change which the turpentine had undergone in becoming able to dissolve the caoutchouc.

Commercial oil of turpentine, acting imperfectly upon caoutchouc, has a molecular rotation of —28°,83. After distillation over a naked fire, this became —33°,23; its power of dissolving caoutchouc increasing with its power of molecular rotation. If the same essence, however, is modified by a temperature still more elevated, as by distilling it on fragments of brick, its solvent power increases still further, but the change produced is accompanied by a considerable diminution in its rotatory power, which is then only —8,68.

By varying the conditions under which the oil is distilled, various modifications are obtained, which prove that a substance with a definite composition may exist in several isomeric states.—*Ibid, from Comptes Rendus* and *Lancet.*

ART. LXV.—ON THE TRUE COMPOSITION OF LABARAQUE'S SOLUTION OF CHLORIDE OF SODA.

By B. Kavanagh, Esq.

The solution of chloride of soda, or the liquor sodæ chlorinatæ, of the London Pharmacopœia, prepared by passing a stream of chlorine gas through a solution of carbonate of soda, is a preparation whose theoretical composition has hitherto been involved in doubt.

MM. Millon and Balard have conceived, and put forward different hypotheses regarding it. The latter chemist considered it to be composed of bicarbonate of soda, hypochlorite of soda, and chloride of sodium. Thus:—suppose four atoms of carbonate of soda to be acted on by two atoms of chlorine. Two atoms of the carbonate of soda lose their carbonic acid, which uniting with the other two atoms of carbonate of soda produce two atoms of bicarbonate of soda. Then one of the remaining two atoms of soda loses its oxygen, and there remains sodium, with which one atom of the chlorine unites, to form chloride of sodium, whilst the disengaged oxygen unites with the other atom of chlorine to form hypochlorous acid, and this uniting with the remaining atom of soda forms hypochlorite of soda. This view of the subject, however elegant in conception, and strengthened by his discovery of the existence of hypochlorous acid (composed of one atom of chlorine and one of oxygen,) and indeed the theory generally adopted at the present day, will be seen to be totally untenable.

M. Millon considers it to be composed of bicarbonate of soda, and oxychloride of sodium. Thus: one atom of chlorine, and two atoms of carbonate of soda, react on each other. One atom of carbonate of soda loses its carbonic acid, which uniting with the other atom of carbonate of soda forms one atom of bicarbonate of soda, whilst the atom of chlorine acting on the remaining atom of soda, form chloride of soda or oxychloride of sodium, according to Dulong's theory of the salts. Namely, that the oxygen or electro-negative element of the base, joins with the electro-negative element added, which uniting with the metal of the base, form a compound analogous to an haloïd salt, except that the electro-negative element is compound. This oxychloride of sodium he considers analogous to the peroxide of sodium in which one atom of oxygen is replaced by an atom of chlorine.

By means of some researches which I have recently made, and which I shall now submit, I have proved, I trust, that this latter theory is a correct one.

That the chlorinated solution contains a carbonate is evident by its giving a white turbidity on the addition of lime water. That this is the bicarbonate may be known by its giving no precipitate with solution of sulphate of magnesia. Now, if to the chlorinated solution we add a solution of alum (the double sulphate of alumina and potash) the alumina is instantly precipitated, *without effervescence*, proving that the chlorinated solution contained a salt of soda other than the bicarbonate, for it must be by it the alumina is replaced, accompanied, on the application of heat, by the evolution of a chlorinous gas. Whether this soda salt is a hypochlorite of soda, or a chloride of soda (oxy-chloride of sodium) involves the point at which MM. Millon and Balard are at issue. The question of course can be solved by ascertaining the nature of the chlorinous gas evolved whether hypochlorous acid or pure chlorine. With this view I placed at the end of the tube from which the gas was allowed to issue a coil of iron wire in order to determine whether the gas was hypochlorous acid, as in such case an insoluble oxide of iron would be formed, but instead of this the soluble chloride was produced, known to be such by its giving with solution of nitrate of silver the usual curdy white precipitate, soluble in strong solution of ammonia but insoluble in nitric acid. I then placed a coil of silver wire in the end of the tube in a similar manner. After the action went on for some time, a white curdy mass was formed, soluble in strong solution of ammonia, but insoluble in nitric acid—chloride of silver.

The united results of both these experiments prove the gas eliminated to be pure chlorine, so that it settles the question in favor of Millon's theory,—that it is a compound of one atom of bicarbonate of soda in combination with one atom of oxy-chloride of sodium in solution.

Ibid, from Dublin Hospital Gazette.

ART. LXVI.—ON THE CONVERSION OF THE ESSENTIAL OIL OF MUSTARD INTO THE ESSENTIAL OIL OF GARLIC.

By Charles Gerhardt.

The artificial production of substances which are generated in the process of vegetation or in the animal economy becomes more and more frequent as organic chemistry advances. I shall now draw attention to one which seems to me to merit attention.

The essential oil to which garlic owes its characteristic odour has been recently analysed by M. Wertheim, and according to this chemist contains $C^6 H^5 S$. It is therefore a sulphuretted body like the essential oil of black mustard, but free from nitrogen.

From the analyses of M. Lœwig, and from the researches recently made by Dr. Will, we know that the essential oil of black mustard does not contain oxgen, andt hat its true formula is $C^8 H^5 NS^2$. The result of M. Simon's observations also appears to be, that the essential oil of the Scurvy grass (*Cochlearia*) is identical with that of mustard; moreover, M. Hubatka has proved that the horseradish yields the same essential oil; and M. Wertheim has also met with it in the oil obtained by distilling the root of another cruciform plant, *Alliaria officinalis,* with water.

Considering these facts, and comparing the composition of the essential oil of garlic with that of mustard, I have been induced to try to convert one into the other by the means which science affords.

The oil of garlic only differs from that of mustard by the elements of cyanogen and of sulphur; we have, in fact,

$$C^8 H^5 NS^2 = C^6 H^5 S + C^2 N + S.$$

In acting with potassium on the oil of mustard, I had to take away the cyanogen as well as a part of the sulphur, and to set free the oil of garlic.

My suspicions were entirely realized; when some pieces of potassium, previously dried over some chloride of calcium and rectified afresh, are thrown into the oil of mustard, it is attacked immediately. It may be slightly heated in a retort to favour the reaction; care must be taken, however, not to raise the temperature too much, for the substance might take fire, as has frequently happened to me.

If the operation is performed with care, the substance does not become much coloured, some gas is disengaged, a white salt is deposited in the oil, and oil of garlic distils over. It is an interesting experiment, the difference of smell between the two oils being so striking: the smell of the garlic is immediately so evident, that this alone might suffice to prove that the conversion takes place as I have just described it.

But I desired to have chemical proofs. I therefore collected the oil which had been produced in the reaction; it was colourless, possessing in a high degree the characteristic odour of garlic, and presented the reactions described by M. Wertheim; shaken with a solution of nitrate of silver it afforded a black precipitate of sulphuret; with the bichloride of mercury (when the aqueous solution was slightly heated to dissolve more oil) it yielded a white, and, with the bichloride of platinum, a yellow precipitate.

Burnt with oxide of copper, it yielded the same relative quantities of carbon and hydrogen as were obtained by M. Wertheim in the analysis of the oil extracted directly from garlic, and rectified without potassium, viz.—

	Rectified oil of garlic.		Oil of
	My produce.	Wertheim.	Mustard.
Carbon	58.8	59.1	48.5
Hydrogen	8.4	8.2	5.1

I have not been able to make more analyses, from want of material.

The salt which separates in this reaction is *sulphocyanide of potassium;* in fact it dissolves easily in water, and gives with the persalts of iron the characteristic dark red colour; it also yields a white precipitate (protosulpho-cyanide ot copper,) with a mixture of deuto-sulphate of copper and of protosulphate of iron, &c. I was unable to discover sulphuret or cyanide.

However, in rectifying the artificial oil of garlic a second time over potassium, I found much sulphuret in the resdue, This reaction appears secondary. Besides, to understand the reaction well, it will be necessary again to examine the gas which is evolved, which want of material prevented me from doing.

The above results seem to be sufficiently conclusive to prove that the oil of mustard is really converted into the oil of garlic by the action of metallic potassium. I intend, however, to return soon to this metamorphosis.

Chem. Gaz. from Comptes Rendus.

ART. LXVII.—PATENT GRANTED TO ALFRED VINCENT NEWTON, LONDON, FOR IMPROVEMENTS IN THE MANUFACTURE OF CYANOGEN AND ITS COMPOUNDS, PARTICULARLY THE PRUSSIATES OF POTASH AND SODA.

This invention consists in the application of nitrogen gas, which is obtained by the decomposition of atmospheric air or from the waste gasses of sulphuric acid chambers, to the manufacture of cyanogen and the cyanides. It is stated that, by the means adopted by the inventor, the difficulties of carrying into practical and economical use the grand principle of employing nitrogen obtained from the surrounding atmosphere have been surmounted.

The different materials which are employed in the process, according to the peculiar circumstances of the case, are as follows:—1. Whatever may be the source whence the nitrogen is obtained, it may always be employed, provided it is not accompanied by oxidating substances. It is not necessary that the nitrogen shonld be perfectly pure; it may be mixed with carbonic oxide, hydrogen, carburetted hydrogen, and other gasses; but the presence of oxygen must be carefully avoided, as well as all matters capable of affording it, as they would tend to destroy the cyanogen as fast as it is formed. This essential point is effected and obtained in an œconomical manner by using atmospheric air, taking the precaution to convert the oxygen contained therein into carbonic oxide, before it is permitted to come into contact with the cyanides already formed. The means by which this is accomplished will be hereafter explained. Another source of nitrogen is the waste gases of sulphuric acid chambers, after being washed in a solution of sulphate of iron and of milk of lime, so as to deprive them of sulphurous and nitrous vapour. The nitrogen so obtained is employed in the same manner as if obtained directly from atmospheric air. 2. The nature of the carbonaceous material which is employed in the process is not of much consequence; satisfactory results have been obtained with wood-charcoal, coke, pit-coal, peat, spent-bark, wood, and other similar substances; but as regards economy, produce and convenience, wood-charcoal in pieces of the size of a hazel-nut is preferable to any other. 3. With respect to the potash and soda, the carbonates are preferred; but any other salt capable of being resolved ultimately into carbonate, oxide or metal, may be employed. Although the choice of the materials is not of much consequence, it is not so with regard to the mode in which they are employed; thus the more or less intimate mixture of the charcoal with the alkali, and the proportions of the two, have a great influence. If the alkaline salt is easily fusible it may be previously fritted with the charcoal, or the two substances may be carefully mixed. It is, however, in general preferable to soak or steep the charcoal in a concentrated alkaline solution, and to dry the mixture before using it; but whatever be the way of mixing the matters, it is of the greatest importance that they should be perfectly dry before they are placed in the retorts. The proportions of alkali and charcoal may be varied to a certain extent, but there are limits which should not be passed; an excess of alkali renders the chemical decompositions incomplete, and a too small proportion is not economical; but according to the difference in the density of the charcoal, it may vary from 25 to 100 parts of alkaline salt to 100 parts of charcoal. With hard wood charcoal, the proportions which have been found to answer best are from 30 to 50 parts carbonate of potash to 100 parts of charcoal, according to the intensity of heat in the retort. As regards the quantity of nitrogen gas, it must be used in excess to hasten the operations; still a too rapid current of gas must be avoided, because it would carry off with it a part of the cyanides already formed, and also a greater or less proportion of unreduced alkali, and deposit them beyond the sphere of action. The combination of the nitrogen is effected most rapidly and completely when the gas is forced through a long column of alkalized charcoal, at a high degree of heat, and under a certain pressure, and when it experiences obstacles and considerable friction in penetrating through the pores of the charcoal and interstices between the pieces; all these conditions are combined in the most effective manner in the apparatus hereafter described.

After having considered these general questions, it remains to determine the most advantageous mode of constructing and working the apparatus. The points most worthy of attention are the following:—1st, heating the mixture of charcoal and alkali to the highest possible degree and in the most uniform manner, and taking the proper precautions to recover the vapours of potassium, sodium, and other alkaline and saline combinations that may be carried off with the waste gases; 2d, to force through the pores and interstices of the alkalized charcoal a steady current of air or nitrogen gas; 3d, to protect the mass of cyanized carbon from all contact with oxygen during the whole period of heating and cooling; 4th, a continuous operation, which is generally so advantageous in manufacturing processes, becomes here a necessity, or at least a most important consideration; because, setting aside the waste of fuel, labour and time, the dilatations and contractions caused by interruptions of the work, occasion a speedy destruction of the apparatus; on this account a perfect steadiness of firing and uninterrupted operations are peculiarly desirable.

The apparatus for carrying out these requisites may be varied in dimensions and form, and may be modified to suit different carbonaceous matters; but without confining the invention to the arrangements of parts herein set forth, two applications are described. The first and simplest form consists of one retort, which is of fire-clay or other suitable material capable of supporting a white heat; it is slightly conical, tapering downward, and open at top and bottom; the best form in the transverse section is elliptic. This is placed vertically in a furnace, heated intensely, and as regularly as possible; its lower end rests upon the flange of a second retort, or refrigerator of cast iron, and of a similar shape, having at the bottom an extractor, mounted on suitable bearings, which is worked periodically by an attendant, to convey the cyanized charcoal into an extinguisher or dip-pipe, the mouth of the latter being plunged into a saline solution, which acts as a hydraulic valve. From the side of the dip-pipe, at a short distance below the extractor, is the waste gas-pipe, which conducts the gases and vapours into the hydraulic main; the end of this pipe is turned downward, and plunged into water or a solution of a salt of iron. By another pipe the incondensible gases are drawn off from the main by a pump, or other convenient aspirating machine.

In the other form of the apparatus there are ten retorts working with one air-pump and one hydraulic main, besides contrivances for drying alkalized charcoal, and a method of working the feeding and extracting apparatus by machinery. The pans or under-backs, which receive the cyanized charcoal as it drops from the extractor, are kept constantly charged with a protosalt of iron, or with hydrated protoxide of iron diffused in the liquor, for the purpose of converting the simple cyanides into ferrocyanides the moment they fall into the liquor. If thought desirable, a fire may be lighted beneath these pans to warm the liquor. The management of the furnace-fire requires much attention, to prevent variations of temperature, and coke is preferred to bituminous coal.

The working of the apparatus will be easily understood. The retort is kept constantly full of alkalized charcoal, and the air-pump set to draw a steady current of air through the materials in the retort. The gas drawn through maybe either burned air, common atmospheric air, or hot air, as supplied to ordinary blast furnaces.

The time required for reducing the alkali, and converting it into cyanide, is in direct ratio to the intensity of the heat; with a good white heat, two or three hours are sufficient to convert almost the whole of the alkali into cyanide.—Whether the retorts are fed by machinery or otherwise, care must be taken to keep them constantly full, according to the working of the extractor, which, as before mentioned, delivers the cyanized charcoal into the dip-pipe, where it drops into the saline solution below; but previous to this it may be cooled in the iron retort, by surrounding a part of that vessel with a cold water-chamber.

The liquor in the under-back should always contain a *slight* excess of iron or ferrosalts, or the alkaline cyanides will be decomposed into formiates of potash and soda and carbonate of ammonia. It is easy to ascertain when sufficient iron is present: by taking out a small quantity of the clear liquor, and dropping into it a little weak solution of protosulphate, or any other protosalt of iron, a white precipitate will fall without any tinge of red; but when, on the contrary, the liquor gives a brown red precipitate, or a mixture of red and white, it wants iron. When it is certain that the liquor contains a slight excess of iron, the charcoal is taken out and thrown into vats or cisterns, and washed, either with cold or warm water, until the salt is completely extracted; the weak liquors are passed successively through new charcoal, by which they are easily brought to 20° Beaumé's hydrometer. At this strength the liquors may be thrown into evaporating pans, and be boiled until the sulphate of potash falls down; this is separated as usual, and drained. The remainder of the liquor is then drawn off into other vessels to crystallize; or, instead of drawing it off, the evaporation may be carried still further, until the prussiate also falls down and separates in a similar manner. The potash mother-liquors serve for fresh operations. The first rough crystals are washed and crystallized a second time, as usual.—Sealed Dec. 13, 1843.—*Chem. Gaz.*

MISCELLANY.

On a new Method of detecting the Adulteration of Essential Oils. By M. Mero.—The sophistication of the different essential oils with oil of turpentine occurs daily in commerce, and no process capable of discovering the fraud with certainty is known; the odour and the various chemical tests have hitherto been insufficient. The essential oils of marjoram, lavender, spikenard, sage, thyme, rosemary, wormwood, and peppermint are the most subject to this adulteration.

In 1838, M. Mero discovered a method of detecting the presence of oil of turpentine founded on the circumstance that this oil dissolves the fixed oils with great facility, while the essential oils above mentioned do not. He considered therefore that it might serve to indicate the presence of oil of turpentine mixed with pure essential oils, whose powerful smell conceals that of the turpentine.

After a great number of experiments, he found that the oil of poppies deserved the preference, because it always possesses the same consistence. It gave the most accurate results in the detection of the presence of oil of turpentine, in small proportions, in the above-mentioned essential oils.

About 3 grms. of oil of poppies are poured into a graduated tube, and an equal quantity of the essential oil to be tested added; the mixture is then shaken, and should become of a milky white if the essential oil is pure, whilst it remains transparent if it contain any oil of turpentine.

The value of this process may readily be ascertained, by first testing a pure essential oil, and then some essential oil of turpentine; if the essential oil be then mixed with the oil of turpentine, even in proportions so small that no advantage could accrue to traders in mixing it, it is found to behave like the essential oil of turpentine itself, that is to say, the mixture is not rendered turbid.

To make this experiment successfully, the mixture of the two essential oils should be very intimate. The method employed in commerce for this purpose is this:—The pure essential oil, and the quantity of oil of turpentine which is to be added to it, are placed in a hot water-bath basin, and this is heated until the mixture, which is at first turbid, becomes transparent.

The mixture which is obtained by adding oil of turpentine in the process of distilling the plants is detected in the same manner.

It is to be regretted that the process of M. Mero cannot be applied in a general manner. It will not detect the essential oil of turpentine in the essential oils of thyme and of rosemary. However, it furnishes the means of recognising the adulteration of several of the esssential oils most in use.

The *Société d' Encouragement* has voted a medal to M. Mero. In some experiments before the Committee, he proved that he could determine at once the mixtures which contained 5 per cent. of oil of turpentine, and was moreover able to tell very nearly the proportions of the mixtures.—*Chem. Gaz., from Journ. de Pharm.*

Occurrence of Starch in Fruits.—Döbereiner found starch abundantly in green and half-ripe apples and pears. Mayer also found a considerable quantity of starch in the juice of apples. According to Schubert, however, starch does not occur until a later period of their developement. He found in September that the surfaces of winter peas, exposed by transverse section, yielded as deep a violet colour with iodine as is observed in potatoes similarly treated, whilst no reaction occurred in the immature fruit. The period during which fruits contain starch does not appear to be of long duration.—*Ib. from Journ. für Prakt. Chem.*

On the Preparation of Strychnic Acid. By M. Rousseau.—Strychnic acid is best prepared by forming 3 parts of strychnine with 1 part chlorate of potash and some water into a thick paste, and warming this with the addition of a few drops of sulphuric acid, after which from 8 to 10 times the weight of distilled water is added, and the whole boiled for a few minutes. On cooling, frequently some sulphate of strychnine or pure strychnine is deposited; they are separated by filtration and the filtered solution evaporated to crystallization. The acid may be then purified by washing with alcohol. It is of a pure white colour, readily soluble in water, but with difficulty in alcohol, has a strong acid reaction, and decomposes carbonates; it disolves the oxides of copper, zinc and iron, and yields crystalline salts; it crystallizes in fine needles of a pure acid taste, is not volatile, but is decomposed by heat. The potash salt is white, soluble in water, insoluble in alcohol, crystallizes in four-sided prisms, and has a cooling taste. The persalt of iron is brick-red, of very acrid taste, and extremely deliquescent. The persalt of copper crystallizes in green rhombic prisms, has a styptic taste, and is soluble in water but insoluble in alcohol.—*Ib. from Journ. de Chim. Méd*

Curious Case of Poisoning with Arsenic.—In the examination of the corpses of two men, supposed to have been successively poisoned by the wife, Wöhler distinctly detected arsenic, even after an interval of seven years and six months. He incinerated all the soft parts of both corpses with nitre. In the man who died last, it was found that during the last moments of his life he had taken phosphuretted oil, and had therein consumed altogether about 16 grms. of phosphorus. On examination of the stock of phosphorus in the apothecary's shop whence it had been obtained, it was found to contain about a half per cent. of arsenic. The phosphorus used in the preparation of phosphuretted oil ought therefore in future to be tested for arsenic.—*Ib. from Ann. der Chem. und Pharm.*

On the preparation of Chlorine Water.—MM. Riegel and Waltz, in their experiments on the quantity of gas contained in chlorine water at different temperatures, have arrived at results exactly similar to those of Pelouze, except that they found the maximum somewhat greater than he did (3 vols. at 50°.) They did not find Buchner's method preferable to that of the fifth edition of the Prussian Pharmacopœia. They also consider the preparation in the dark, and the preservation in bottles with glass stoppers, as unnecessary. The water appears to be best preserved in small bottles with good corks, and covered with bladder. That which contains about $2\frac{1}{2}$ volumes of chlorine, and preserved at 54° Fahr., appears to keep best. They reccommend therefore that the chlorine evolved from 12 parts of well-dried chloride of sodium, 9 parts of peroxide of manganese, 10 parts of concentrated sulphuric acid and 10 water, be conducted into distilled water which is retained at the temperature of 54° Fahr. until it is saturated. The chlorine contained in it is best tested, acccording to the authors, with a solution of pure indigo in sulphuric acid, which is so diluted as to contain $\frac{1}{184}$th of indigo. 2 parts of chlorine water of the above strength are exactly sufficient to decolorize 1 part of this solution of indigo. To detect muriatic acid, the authors recommend metallic mercury, and for chlorous acid the protochloride of mercury.—*Ib. from Jahrb. für Prakt. Pharm.*

Testing of Essential Oils by means of Sulphuric Acid. By M. Voget.—The author considers concentrated sulphuric acid as the best reagent for detecting adulterations of essential oils with oil of turpentine. The peculiar colour which the former assumes with sulphuric acid is much altered by the intense reddish-brown colour which the oil of turpentine yields; and moreover the heat evolved with the oil of turpentine is greater than that with other oils. In testing, the oils are best dropped upon a glass plate, beneath which is placed a piece of white paper; 5

drops of the oil are then added to 1 drop of fuming sulphuric acid, and the two are mixed with the finger.—*Ib. from Archiv. der Pharm.*

Adulteration of Iodide of Potassium.—M. Destouches found in some iodide of potassium derived from Paris 22 per cent. carbonate of potash. The preparation was milk-white, turned red litmus-paper strongly blue, and effervesced with weak acids.—*Ib. from Journ. de Pharm.*

Mode of ascertaining the Purity of Myrrh. By M. Righini.—The myrrh is finely pulverized and triturated for a quarter of an hour with an equal weight of sal-ammoniac powder, then 15 times the weight of water gradually added. If the whole dissolve quickly and entirely, the myrrh is pure.—*Ib. from Journ. de Chim. Med.*

Of the Manufacture of enamelled cast Iron Vessels.—Iron pots, and especially thos eof enamelled cast iron, are very extensively used in domestic economy. To enamel these vessels, they are cleaned as perfectly as possible with weak sulphuric acid, then washed with cold water, and dipped into a thin paste made with quartz first melted with borax, felspar, and clay free from iron, then reduced to an impalpable powder, and sufficient water added to form a rather thin paste. These vessels are then powdered in the inside with a linen bag, containing a very finely-pulverized mixture of felspar, carbonate of soda, borax and a little oxide of tin. Nothing then remains but to dry the pieces, and heat them in an enammelling furnace. The coating obtained is very white, resists the action of fire without cracking, and completely resists acid or alkaline solutions.—*Chem. Gaz.*

On Benzoline, a new organic Salt-base obtained from Oil of Bitter Almonds. By George Fownes, Esq., F. R. S.—Pure oil of bitter almonds is converted, by the action of a strong solution of ammonia, into a solid white substance having a crystalline form, and which was termed by M. Laurent *hydrobenzamide.* The author found that this substance, by the further action of alkalies, became harder and less fusible than before, and not differing in chemical composition from the original substance, but exhibiting the properties of an organic salt-base. To this substance the author gives the name of *benzoline.* He finds that the salts which it forms by combination with acids are, in general, remarkable for their sparing solubility; and that many of them, as the hydrochlorate, the nitrate and the sulphate, are crystallizable. Of the properties of these salts the author gives a detailed account.—*Ibid.*

Ashes of Human Blood and Saliva.—100 parts of the human blood contain—

Tribasic phosphate of soda	22·1
Chloride of sodium	54·769
" potassium	4·416
Sulphate of soda	2·461
Phosphate of lime	3·636
magnesia	0·769
Oxide of iron with phosphate of iron	10·77

100 parts of the ashes of the saliva contain—

Tribasic phosphate of soda	28·122
Chlorides of sodium and potassium	61·93
Sulphate of soda	2·315
Phosphates of lime, magnesia, and iron	5·509

Chemist, from Enderlin, Annalen, and *Lancet.*

Extract from a note on Lactucarium. By M. AUBERGIER.—M. Aubergier having ascertained that alcohol at 21° easily separates the active principles of lactucarium from the wax, resin, and other inert matters which accompany it, proposes to prepare an extract and syrup of lactucarium in the following manner:

Lactucarium is exhausted by being twice heated with alcohol at 21°; the liquors are distilled, and the evaporation is carried on in a sand-bath, with continued stirring. The extract thus obtained is brown, bitter, and deliquescent. M. Aubergier recommends its use for the preparation of pills and syrup of lactucarium.

℞. Alcoholic extract of lactucarium,	1 part
Simple syrup	50 "

Dissolve the alcoholic extract in a sufficient quantity of boiling syrup. Strain the solution while warm, and immediately add to the boiling syrup. The syrup is rendered turbid by cooling, but it does not deposit. —*Ib. from Journ. de Chim. Med.*

THE

AMERICAN JOURNAL OF PHARMACY.

JANUARY, 1846.

ART. LXVIII.—OBSERVATIONS ON ACETATE OF ZINC.

By William Procter, Jr.

In the last edition of the United States Pharmacopœia, the formula for preparing acetate of zinc was revised, the process by double decomposition between acetate of lead and sulphate of zinc was repudiated, and a new method adopted, which consists in precipitating the lead from a solution of acetate of lead, by introducing into it a quantity of metallic zinc. When the materials employed are pure, the salt can be obtained by this process with the utmost readiness, and in a beautifully crystallized form; but if, as is often the case, the zinc employed contains iron, the salt is always contaminated with the acetate of that metal, which gives it a yellowish brown colour. The solution of acetate of zinc when first separated from the metal is colourless, the iron in it being in the state of protoxide, but by standing exposed to the air, or by heat, it gradually assumes the form of sesquioxide, and communicates colour to the solution.

It is with a view to this condition that the Pharmacopœia directs the addition of a filtered solution of chlorinated lime; the lime of the added salt displacing the ferruginous oxide, which is at once peroxidized by the action of the chlorine. This operation succeeds best when the iron is in its first, stage of oxidation, or else it will seldom answer the end in view, and frequently fails altogether.

The author on a recent occasion in preparing several pounds of this salt, employed an article of zinc, said to be free from iron, but which was found to have contained a considerable portion of it. In resorting to the calcareous chloride for assistance in the difficulty, it was found that repeated additions of the chloride failed to separate the iron, the solution became amber-coloured and transparent.

In seeking for a remedy, a trial was made by boiling the coloured solution with hydrated carbonate of zinc and filtering, which was found to separate the iron entirely, affording a perfectly pure and colourless solution of the acetate. The best plan of proceeding is as follows: Separate about one-thirtieth part of the colored liquid, add a slight excess of carbonate of potassa and wash the resulting carbonate of zinc until freed from acetate of potassa. The magma of carbonate of zinc thus obtained is added to the boiling solution in divided portions, until, on filtering a little of the liquid, it is found colourless; when the whole should be filtered off from the colored carbonate of zlnc, evaporated and crystallized.

Since employing the above method, a more simple, though less unobjectionable application of the same principle has been tried, which consists in merely throwing into the coloured acetate a solution of carbonate of potassa; of course carbonate of zinc and acetate of potassa are produced, and the carbonate, from being presented in its nascent state, is peculiarly fitted for acting on the acetate of iron. The small quantity of acetate of potassa in the solution remains in the last mother liquor.

This method of using the hydrated carbonate of a metallic oxide to free its soluble salts from iron, has been employed in the case of manganese; but I am not aware of its having been used with this intent in the case under consideration.

Whilst on this subject it may be well to make a few remarks touching other points in the manufacture of this salt, for the benefit of those who may not have learned them by experience.

1st. The large amount of zinc directed in the Pharmacopœia is not necessary when the metal has a great surface in proportion to its weight; as when in the form of sheet zinc. 2d. It sometimes happens that the precipitation of the lead proceeds very slowly, which is owing to the surface of the zinc being coated with oxide or other foreign matter. By washing the zinc with diluted acetic acid, before introducing it into the solution, it acts very promptly. 3d. As in large operations it is of much importance to employ as little fluid as the nature of the case will admit, in order to save evaporation, it has been found that by mixing the sugar of lead with one-half of the prescribed quantity of water, the excess of it is gradually dissolved and decomposed as the operation proceeds, because the resulting acetate of zinc is less bulky and more soluble than the lead salt. 4th. In effecting the crystallization of acetate of zinc, it frequently happens that instead of brilliant six-sided plates or tables of large size, the salt is deposited in minute scales or crystals, radiating from centres which form a thick magma with the mother liquid, difficult to drain. This is owing to concentrating the solution too much, or to cooling it too rapidly, or both. By adopting Faraday's suggestion of removing a drop to a glass plate from time to time, as the evaporation proceeds, the proper point of concentration is easily ascertained. Sometimes, however, this imperfect crystallization is owing to the presence of a less soluble sub-salt, (caused by the loss of acetic acid) which is known by the opacity of the liquid when an attempt is made to re-dissolve the acetate. In order to remedy this it is necessary to add as much acetic acid to the hot concentrated solution before crystallization, as will enable that solution to retain its transparency when added to twice its bulk of water.

ART. LXIX—AN ADDRESS DELIVERED TO THE GRADUATES OF THE NFW YORK COLLEGE OF PHARMACY, NOV. 20th, 1845. By GEORGE D. COGGESHALL, Esq., Vice President of the College.

AT a stated meeting of the College of Pharmacy of New York, held November 20th, 1845, Messrs. Buckland W. Bull, Joseph Roberts, and William B. Riker, were declared graduates in Pharmacy; whereupon they were addressed by George D. Coggeshall, Esq., one of the Vice Presidents of the College.

On motion, the Secretary was requested to call on Mr. Coggeshall, and request a copy of his address for publication in the American Journal of Pharmacy.

JOHN MEAKIM, Secretary.

ADDRESS.

GENTLEMEN, GRADUATES OF THE COLLEGE:

It has become a part of the business of this meeting to confer upon you a testimony of honor and confidence to which you have earned a title by diligence in practical and theoretical study. We trust that while it may prove to you a letter of credit, wherever your future course may be directed, it will ever be an incentive to honor the institution which has cherished you, as you best can do, by faithfully and zealously performing the duties of your profession.

And we would earnestly press upon your attention that your studies, though with good conduct, they have brought you to an auspicious point, have but fairly commenced. The field of learning which opens before you, is too vast to be embraced in the teaching of any school, in which the main outlines and points of every day concern only can be enforced, giving the student, however, a direction and onward impulse, very helpful to him certainly, but which he must energetically maintain for himself. Unfortunately, too, the schools of Pharmacy in our country, are feeble in resources, unaided by government, and as yet, except in a limited degree, by public opinion. They were originated, and have been sustained, thus far, by the resolute and unselfish labors of men engaged in business, who had least to gain by their successful prosecution, aided in progress of time by their own graduates, who, from industrious students, have come to rank among their most esteemed and efficient co-laborers.

Institutions devoted exclusively to the advancement of our art, have long flourished in Europe, deriving patronage and power from their governments, possessed of most extensive libraries, cabinets and variety of apparatus for chemical and philosophical demonstrations. In these schools the teaching of Pharmacy and its collateral branches of science, extending beyond our courses to Botany, Mineralogy, Geology, Natural Philosophy, Physiology, Toxicology, and Medical Jurisprudence, has attained a degree of excellence which we can scarcely hope to reach until the general sentiment shall demand it. There, too, learners of our business are required to possess previous qualifications, are subjected to a length of laborious servitude, followed by searching, minute and extended examination; and those who practice it, though protected in their rights and privileges, are held to a rigorous accountability, which in the individual latitude enjoyed—or rather suffered—under our laws, could hardly be realized, and if they existed, would deter many from encountering their difficulties.

Yet if we have approached so distantly the standard of schools in older nations, we may congratulate ourselves on having done much according to our ability, The improvement in the appearance of our stores, in the degree of cleanliness, and method of their manipulations, in the number and accuracy of their preparations, and more than these, in the quality of drugs and chemicals which they dispense, are abundantly manifest to all whose duties or necessities make them acquainted with the subject. Our meetings have been pleasant occasions for mutually extending information on all matters concerning our business. An increasing spirit of emulation has also been excited in our students, prompting them to obtain their degrees with something more of credit than mere form, and this promises well for the future. We regret that we have been unable to do more for them; we hope they will help us to do more for their successors.

Gentlemen, you are about to enter upon the discharge of duties, the importance and responsibility of which, are most felt by the most virtuous minds. Upon the Apothecary, of all men, the Golden Rule is laid with most emphasis. With whatever anxious care you select, with whatever watchful precision you weigh, measure, and combine for yourselves or for any one whom you hold in more regard than yourselves—"you should do even so unto others." Those who repose their trust in you may have equally vital hopes and interests in jeopardy, which must not be sacrificed by the slightest failure in any part of your duty. Strive to emulate the achievements and fame of men, who from humble origin have taken rank amongst the greatest benefactors of mankind, and have shed lustre over our profession. But if you do not reach their eminence—if it should not be your supreme good fortune to light a safety lamp, or to demonstrate the existence of proximate principles—"all stars cannot be of the first magnitude"—you may yet, if you will, occupy the station which is your lot with great practical usefulness to all around you. Let incorruptible integrity be your chief governing principle. Upon such a basis you cannot but found an honorable character, for you will be impelled to the best exertion of all your faculties. Let no prospect of gain ever tempt your manhood from a straightforward honest course, down into the infamous arts of quackery. Your legitimate business, honestly and industriously pursued, will scarcely fail to give you competence, will certainly ensure you a peculiar and a higher degree of respect than is shown to general tradesmen, and above all—though it may not be fully appreciated on "Change"—the countless treasure of a good conscience.

The College of Pharmacy of the City of New York, upon the recommendation of its Board of Trustees, declares Buckland W. Bull, Joseph Roberts, and William B. Riker to be Graduates in Pharmacy, and awards to each of them its Diploma.

ART. LXX.—REMARKS ON THE PREPARATIONS OF SENEKA.

By William Procter, Jr.

However useful the properties of a drug may be in a medical point of view, it depends often in great measure on the skilful application of the Pharmaceutic art, whether the physician derives that degree of assistance from its use which he anticipates, and of right expects. Among the valuable remedies composing our indigenous Materia Medica, perhaps no one has acquired more celebrity than Senega, and it is with the design of attracting the attention of pharmaceutists to the preparations of this drug, that the following remarks are made.

Five successive analyses by Gehlen, Feneulle, Dulong, Folchi, and Quevenne, have thrown much light on the proximate chemical constitution of the root of Polygala senega, but it is more especially to the latter chemist that we are indebted for this knowledge. In the 22d volume of the *Journal de Pharmacie,* M. Quevenne has published an elaborate essay on this subject, comprising a history of its constituents, and particularly of its active principle, *polygalic acid*, which he describes as a white, inodorous, pulverulent substance, unalterable in the air, and capable of producing very energetic effects on the animal economy. Its acid character appears to be well established, as it reddens litmus and combines with bases to form salts, which are uncrystallizable, but its intensity is so slight that it is incapable of displacing carbonic and hydrosulphuric acids from their combinations. It is this principle which causes the decoction of seneka to redden litmus, and which gives it the tendency to froth by agitation. It is analogous in many of its properties to saponin, and in some respects to sarsaparillin. When in a pulverulent form it is brought in contact with the nasal membrane, it produces sneezing and local inflammation of the part, and when swallowed causes a painful astrictive sensation in the throat.

Polygalic acid in a free state dissolves but slowly in cold water, but with great readiness when assisted by heat; nevertheless cold water removes it completely from the powdered root, which may be due to its association with other principles, as in the cases of sarsaparillin, cantharidin, etc. Boiling alcohol dissolves it largely, from which by cooling it precipitates in a pulverulent form, and this is true also of dilute alcohol. Perhaps those who have prepared a tincture of seneka with the intention of resorting to it as occasion might require for making the syrup, have noticed a light coloured precipitate to separate after standing some time. This is polygalic acid, and should not be removed, as it will redissolve by the heat requisite in the evaporation of the alcohol. This principle, notwithstanding its acid nature, appears to be incompatible with but few substances, and according to M. Quevenne, it may be associated without impropriety with all ordinary salts, except subacetate of lead and protonitrate of mercury. M. Quevenne isolated polygalic acid by treating the root with cold water by displacement, precipitating the cold infusion with subacetate of lead, washing the precipitate with water, suspending it in that fluid, and the lead precipitating by a current of sulphuretted hydrogen. The filtered liquid is then evaporated to an extract, this exhausted by boiling alcohol 40° Baumé, and the extract resulting from the evaporation of this alcoholic fluid treated with water, which takes up the polygalic acid and leaves a yellow matter. The solution containing the polygalic acid is again treated with subacetate of lead, sulphuretted hydrogen and evaporation, and the extract obtained is dissolved in boiling strong alcohol which deposites the polygalic acid in a pure state by cooling.

Polygalic acid may be obtained pure enough for medical use, by treating the powdered seneka with boiling alcohol of 35° Baumé until exhausted, removing the alcohol by distillation until the fluid is reduced to a syrupy consistance, then treating it with ether to remove fatty and resinous matter, and mixing with a quantity of cold strong alcohol—which, by standing several days, precipitates the acid of a light brownish colour. In this state it is impure, and requires to be redissolved in hot alcohol boiled with animal charcoal and filtered while hot. When it separates in a pulverulent form, M. Quevenne has proposed the employment of polygalic acid as a therepeutic agent and from its easy preparation and great activity, there appears no good reason why it should not be added to the list of medicinal proximate principles. The physician would be enabled to control the action of the remedy more completely, and by combining it with other substances, to modify its influence. The patient would be less inconvenienced by its administration, as its concentrated form admits of its being more easily disguised in mucilage in syrup or in pill.

From an approximative estimate, M. Quevenne infers that one grain of polygalic acid represents the activity of a dram of seneka.

The following formula would represent an ounce of the root and a pint of decoction, or four fluid ounces of the syrup:

Take of	Polygalic acid	grs. viij.
"	Boiling water	f.℥ss.
"	Syrup of gum arabic	f.℥iss.

Dissolve the acid in the warm water and add the gum syrup; one fluid-dram of this syrup would be equivalent to half a dram of seneka. The addition of ten drops of liquor potassæ will supercede the necessity of the water being hot, as the alkaline polygalate is very soluble—while at the same time its activity is not decreased.

The officinal preparation of seneka, which has received the most universal employment, is the decoction. It is the only one to be found in the British Pharmacopœias, and this may be looked upon as an evidence of the low esteem in which seneka is held by the practitioners of Great Britain, a fact admitted by Pereira. It is but seldom that the apothecary is called upon to prepare this decoction, the physician directing a quantity of the root, often in combination with some other remedies, to be placed at the disposal of his patient, with directions to pour a certain quantity of water on it, and boil for a given time, or until reduced to a stated measure.

From imperfect manipulation, assisted, perhaps, by the want of a proper degree of comminution, the root is but half exhausted. It has frequently happened, owing to the omission of directions in the prescription, that the unbroken roots have been used to make the decoction!

In every case where such substances are prescribed with a view to their being prepared by the patient, the pharmaceutist is justified in assuming the interpretation of the prescription by reducing them to a proper state of division.

When prepared by the apothecary, if time is allowed, resort should be had to the method of displacement which yields a transparent and more concentrated infusion; but if that is inadmissible from limited time, or the nature of associated substances, maceration in warm water, (120° Fahr.) and subsequent expression, will be more appropriate. It is best to associate with the decoction some demulcent substance to mask its acrimony. The Hamburg Pharmacopœia directs Iceland moss, liquorice is often used, and slippery elm, and flaxseed are occasionally prescribed.

In the 15th volume of this Journal, the writer offered a formula for the preparation of an extract of seneka, which consisted in exhausting the root with diluted alcohol and evaporating the tincture carefully to the consistence of an extract; and proposed its employment in medicine, both in pill and as a ready means of making the decoction. This extract dissolves almost entirely in water, and affords a more eligible preparation than that by the officinal formula; and by its means the preparation can be dispensed at once. It may be as well to observe that the displacement of seneka is effected with greater rapidity by employing a menstruum composed of two parts of water and one of alcohol; the maceration may be continued longer in warm weather without fear of change, and is more readily evaporated.

The syrup of seneka when properly prepared is a very efficient preparation, one pint embodying the strength of four ounces of the root. The framers of the United States Pharmacopœia in adopting the method of displacement as a means of exhausting the activity of medicinal substances, have almost invariably given the old formula, at the same time, as a cautionary measure, founded on the presumed want of knowledge on the part of the apothecaries of this country, of the proper application of that principle. This, as a progressive movement, was doubtless a wise precaution, but it is to be hoped that the experience which shall have been acquired in its employment by the next revision of that work will justify the unconditional adoption of that useful process in every case where it is proper, and its rejection otherwise.

The syrup prepared by the second formula of the Pharmacopœia is in all respects preferable to that by the first, or boiling process. The latter directs four ounces of bruised seneka to be boiled in a pint of water until the menstruum is reduced one half, then strained, and afterwards made into a syrup with the sugar. If these directions are literally followed, a syrup will be obtained super-saturated with sugar, because when it is attempted to strain a concentrated decoction of seneka composed of eight fluid ounces of liquid, with four ounces of seneka, in its swelled state, disseminated through it, not more than four or five fluid ounces will be obtained, unless subjected to much greater pressure than is at the command of most apothecaries, and consequently, unless in case the fluid is made up by the subsequent addition of water, the syrup contains too much sugar, and in either case will not embody all the strength of the root employed. A better plan would be to infuse the root in a close vessel until it was exhausted, then strain the infusion, and by subsequent evaporation reduce it to the required measure. The formula for compound syrup of squill (which would be more correctly designated compound syrup of seneka) has been amply discussed in a preceding volume of this Journal.

ART. LXXI—PROCESS FOR PREPARING VALERIANIC ACID.

By Messrs. T. and H. Smith.

Having of late had considerable demand for valerianate of zinc, in consequence, probably, of a desire among medical men to test its value as a therapeutic agent, we were led to inquire whether a method of obtaining the acid of valerian more quickly and abundantly than by the usual process, so very unsatisfactory in these respects, could not be devised. The method we adopted completely answered our expectations, and as it may be of some use as a guide to other chemists, who may have occasion to prepare valerianic acid, the process is subjoined.

Let the valerian be boiled for three or four hours in rather more than its bulk of water, holding in solution an ounce of carbonate of soda for every pound of the root, and replacing the water as it evaporates. Let the liquid be strongly pressed out, and the residuum again boiled for a little with a like quantity of water. After another pressing, let the process be repeated in the same way, a third and last time. After mixing the liquids, and adding two fluid drachms of strong sulphuric acid for each pound of the root used, let them be distilled. When about three-fourths of the liquid have passed into the receiver, let the distillate be fully neutralized with carbonate of soda, for which purpose a quarter of an ounce for every pound of the root will be quite enough. The valerianic acid can then be obtained in the usual way—viz., by concentrating the solution of valerinate of soda, decomposing it with sulphuric acid, and separating the valerianic acid, now set free, either by means of a separator or distillation. When the valerianic acid has been once obtained, no difficulty can occur in preparing any of the valerianates.

The advantage of this method over that in which the root itself is simply distilled with water, will be seen on contrasting the results of both. By the latter method, the time required was six times greater than when the valerianate of soda in solution was distilled after adding a strong acid; and although the sacrifice of time was so much greater in the first case, the contents of the still continued to smell strongly of valerian, while in the latter, not a trace of the peculiar odor of valerianic acid could be detected, showing that the principle had been more effectually exhausted. And further, the amount of acid obtained, four scruples from the pound of root, was nearly thrice as great as could be got without the use of soda.

Since the above process was adopted by us, M. S. Rabourdin, Pharmacien à Orléans, has published in the *Journal de Pharmacie,* a method suggested apparently by views of the subject similar to our own. He conceived that the valerianic acid might be partly in combination with a base, and that, by adding a strong acid, the volatile acid would be completely set free, so that, on distillation, a much larger product would be obtained. The result wholly justified his preconceptions. Five kilogrammes of the root gave from forty-five to fifty grammes of the acid, a result closely agreeing with the quantity produced by our own process.

The principle of the process suggested is very simple. In the one case an acid is presented to a valerianate, or supposed valerianate, to free it from combination with its base, by the exertion of a stronger affinity; while, in the other case, a base (soda) is presented to the valerianic acid, powerful enough to cause its effectual separation from that with which it was previously combined.

The two processes serve the same end; but it seems to us that the latter is, on the whole, to be preferred, principally because it has the advantage of presenting the acid in a state of complete solution, from which the operator can get it more easily and effectually detached, than when contained in the hard unyielding cells of the woody fibre.—*Chemist, from London Lancet.*

ART. LXXII.—ON THE TRANSFORMATION OF PERCHLORIDE OF MERCURY INTO PROTOCHLORIDE, BY CERTAIN PHARMACEUTICAL PREPARATIONS. COMPOUND PREPARATIONS OF MERCURY NOT INCOMPATIBLE WITH THESE PREPARATIONS.

By M. Lepage.

More than forty years since M. Boullay, at the present day one of the most learned professors of French pharmacy, pointed out the reduction of perchloride of mercury (corrosive sublimate) by contact with the syrup used in cookery, and its transformation under these circumstances into protochloride or calomel.

The observations of M. Boullay have, since the time he made them public, been confirmed by many experimentalists. Very recently, also, a distinguished chemist, M. Mialhe, read a paper before the *Societé de Pharmacie,* on several experiments of his own, during which he also recognized the transformation of sublimate into calomel by mixture with several pharmaceutical preparations, and particularly with the cook's syrup, a phenomenon this chemist attributes to the *glucose* the preparation contains.

M. Mialhe has also discovered that the perchloride of mercury remains unaltered by the contact of pure syrup of sugar. Having had occasion to devote ourselves for some time past to experiments on the same subject, we, also, believe it to be our duty to inform the *Societé de Pharmacie* of the results. Our experiments teach us:—

1. That corrosive sublimate placed in contact with the cook's syrup, is completely decomposed and converted into calomel. The transformation begins immediately the mercurial salt and syrup are mixed, and it is first perceived by the syrup losing its transparency. As fast as the calomel is generated it falls

by little and little, to the bottom of the vessel, and after some time it may be collected to be subjected to particular examination.

2. That sal-ammoniac, and other alkaline chlorides, do not prevent the change taking place, and that, in as short a space of time, contrary to the opinions of some writers, who pretend, that in such a case, in the instance of sal-ammoniac, for example, when added to the mercurial salt, it gives stability to it, and prevents the reduction taking place.

3. That with the cook's syrup, previously acidulated by a few drops of hydrochloric acid, the reduction of the sublimate into calomel, equally takes place.

4. That the simple syrup of sarsaparilla (prepared from the hydro-alcoholic extract of the root, according to the formula) also transforms the sublimate into calomel.

5. That the syrup of honey, completely freed from the wax by means of chalk, also effects its reduction; but that with this and the preceding preparation, the complete transformation appears to be much slower in being effected, for we have found it possible, after a contact of two months, to separate a small quantity of sublimate by shaking it up with ether, while we have been unable to discover that salt when mixed with the cook's syrup, after the same lapse of time, and by resorting to the same means.

6. That the pure syrup of sugar does not decompose the sublimate, as M. Mialhe has also ascertained.

In the presence of there being well-established facts of which a good many medical men hold no account, for we still see them, we may almost say, daily prescribe sublimate mixed with cook's syrup, or some analogous preparation, we have asked ourselves if, among the soluble preparations of mercury possessing medicinal properties analogous to those of sublimate, there may not be some which could be mixed with syrups loaded with extractive matter, without undergoing decomposition? We have made experiments on this subject, and have discovered that bicyanuret of mercury* and the iodhydrargyrate of ioduret of potassium, which, as it is known, possesses properties very analagous to those of perchloride of mercury, are not affected by the above mentioned preparations, which transform sublimate into calomel. We possess mixtures of these two substances, with the cook's syrup, made more than a year back, in which the cyanurate and the iodhydrargyrate have experienced no decomposition.

The iodhydrargyrate of the ioduret of potassium, discovered by the late Polydore Boullay, has been, as we know, frequently employed with success, for several years, by Dr. Puch, physician to the *Höpital du Midi,* as a remedy in syphilitic diseases. It is usually prepared by combining equal parts of ioduret of mercury and ioduret of potassium.

We entreat those physicians who, for the future, wish to combine a vegetable with a mercurial treatment, to consider the facts we have here related.—*Chem. from Jour. de Pharm*

ART. LXXIII—ON AQUA REGIA; ON HYPONITRIC ACID, AS A MEANS OF OXIDATION; ON THE CONSTITUTION OF THE SAME ACID, AND THE PART IT ACTS ON BEING PUT IN CONTACT WITH ORGANIC SUBSTANCES.

By Dr. Kœne, Professor of Chemistry at Brussels.

Contiuued from p. 211.

On the part which Hyponitric Acid acts when in contact with Organic Substances.

22. The property of hyponitric acid to convert most bodies into oxides of the highest stage of oxidation, is attri-

---

* The basic cyanuret of mercury (oxycyanuret,) however, deposits after a time almost inappreciable traces of metallic mercury, by contact with the cook's syrup.

butable to its sparing degree of stableness. This property is one of the causes owing to which the acid in question is devoid of the principal character of acids. It has, therefore, no other function than that of oxidating; as it cannot combine with chlorine, whatever be the circumstances under which these two bodies are brought together; be it in a nascent state in the presence or absence of water, at a moderate or low temperature, and even in the presence of a powerful base,* chlorine will invariably be disengaged as soon as the hydrogen of the hydrochloric acid begins to act on the oxygen of the nitric acid (19). Of this body, no other combination with an elementary substance is known than that with oxygen; and it may be anticipated, that it will never be possible to form any, as this cannot be brought about with chlorine, which, owing to its great analogy with oxygen, relative to polarity, is able to act a part analogous to that of the said metalloïd.

The hyponitric acid, therefore, does not act in the manner of compound radicals. May it be supposed that in some organic combinations it acts the part of a single body? In the present state of science, this is a question of the highest importance; and it may even be anticipated, that the future state of the chemistry of compound radicals will depend upon the precision with which this question will be settled.

23. By reacting upon an organic substance, and by oxidating one equivalent of hydrogen, according to the principles of the theory of substitution, nitric acid forms $(M—H^2+\overset{\cdot\cdot\cdot\cdot}{N},)$ it appearing, from the analysis of the fresh combination, that M by losing H^2 has combined with $N^2\,O^4$.

---

* We satisfy the latter condition by directing a current of hydrochloric acid into nitre. If the salt is quite dry, at a common temperature, no action takes place; on applying, however, a gentle heat, or on making use of nitre which is not dry, chlorine, water, and nitrous vapors, are formed, products resulting from the influence of the water on the vapors; and, finally, chloride of potassium is left behind.

According to Berzelius, however, the new combination has to receive the formula :

$$(M+O-H^2)+\dddot{N};$$

and combinations could even be obtained as follows :—

$$[(M+O^2-H^2)+\dddot{N}^2][(M+O^3-H^4)+\dddot{N}^3]^*$$

Hence, according to the first hypothesis, the fresh combination is corresponding with that on which the nitric acid acted ; whereas, according to the second, it is composed of nitrous acid and an oxide of a compound radical.

We have, therefore, in the above instances two hypotheses, leading to different theoretical views, as they emanate from an arrangement of combinations, which is not one and the same in both. Investigations calculated to support one or the other of these hypotheses are highly important in the present state of science, and the more so as the establishing of one of them will be the means of ascertaining the constitution of organic combinations, and thus raise the study of these combinations to the rank of an accurate science.

24. *That the hyponitric acid in organic bodies does not act the part of a radical, appears from the foregoing experiments and considerations, especially from the action of hydrochloric acid on nitrate of potassa.*

Previous to having established this fact, I gave credit to the hypothesis of MM. Dumas and Couërbe. What resulted from other experiments relative to the nature of oxysulpho-sulphuric acid, did not remain without influence on my views of that of hyponitric acid. Not knowing, however, which is the precise part acted on by this acid, and considering it as a dehydrogenating body kindred to chlorine, I was of course induced to consider this as a radical, as is done with the latter metalloïd, which in organic substances

---

* As it is impossible to enter now into the details of the above two hypotheses, we leave unmentioned the circumstances under which the said process appears to others, when nitrogen or nitrous oxide enters into the compound radical. Our object was merely to bring into a parallel the principles of the views relating to the matter.

may frequently displace the hydrogen. It is owing to the dehydrogenating power of the hyponitric acid, that its elements have been found in several combinations formed by its influence, in the manner of chlorine, which is found in a body, that by substitution yielded hydrogen to that metalloïd.

Though the hyponitric acid, however, in the presence of several organic bodies may act in the manner of chlorine, it is yet not proved, that it really acts like the said metalloïd, under circumstances in which it behaves like a simple body. The hypothesis of the function of this acid, therefore, reposing only on theoretical observations, and not being warranted by a single well-established fact, it became necessary to base it on rigorously examined facts. It having, however, appeared, from our investigations, that the hyponitric acid does not act the part of a radical, not even with reference to the body, which, relative to polarity, offers the greatest analogy with oxygen, we attempted to explain the action of this acid on organic bodies in another manner, considering it as a means simultaneously oxidizing and dehydrogenating. Free, therefore, from any preconceived opinion, we have examined Berzelius's theory, which we have found to agree with the present state of science, and to explain most of the facts ascertained in a satisfactory manner, to such an extent that, with some restrictions, we do not hesitate to give it our sanction.

25. *That the hyponitric acid, relative to organic bodies, acts the part of an oxidating and dehydrogenating means, is a conclusion directly to be deduced from its oxidating power*, as an organic body, by being transformed, yields a combination, which is the more stable the more complete the change is. The hyponitric acid, if it partially dehydrogenates a body, or if it forms a combination, on which, under the circumstances then taking place, it no more exerts any dehydrogenating influence; it may convert this

body into an oxide, an acid, and sometimes even into a salt.

26. The oxide, at the moment of its formation, may combine with nitrous acid, the oxidating power of which is less than that of the two other acids of nitrogen.*

If the oxide formed does not enter into a combination, it continues to remain under the influence of the oxidating agent, it is raised to higher stage of oxidation, and converted not either into a simple nitrogenous acid (effect of nitric or hyponitric acid on ethereal oils, on parafin, &c., substances free from oxygen,) or into a nitrogenous double acid (nitro-naphthalinic acid, &c.)

If, finally, this acid reacts on an oxysalt, produced by its influence, a salt may be formed raised to a higher stage of oxidation (effect of nitric acid on naphthalin, benzin, &c.)

Even by other acids than those formed by the influence of the said acids, the oxidation may be brought about (effect of hyponitric acid on neutral fatty bodies.)

The formation of organic, not nitrogenous, acids, produced under circumstances as above, and the effect of hyponitric acid on fatty matters, are most important facts, serving as evidence that this acid acts, indeed, the part of an oxidating as well as of a dehydrogenating means.

If, however, an oxyacid, with compound radical, containing hydrogen, may be produced by the oxidating action of hyponitric acid, it may, likewise, happen, that by the action of the same, or of that of nitric acid, on other organic bodies bases may be formed, acidity and basicity being respectively dependent on an opposed tendency, resulting from the various manners in which the molecules are arranged, or the circumstances under which this grouping takes place, and on those under which these bodies combine, &c. Nothing, therefore, stands in the way of the for-

---

* From instances to be adduced in the sequel, it will appear that these processes are, indeed, of the kind as stated.

mation of a base, which combining with the least powerful oxidating means, resulting from the partial deoxidation of the nitric and hyponitric acids, it yields a nitric salt.

27. On allowing concentrated nitric acid to act, for instance, on acetone $C^5H^{12}O^2$, two combinations are obtained $(C^6H^6O+\dddot{N},)$ $(C^6H^6+\dot{H})$ which result from the dehydrogenating action of this acid ; the elements of the base C^6H^6O, in this case, are present in the acetone.

If, however, this acid is allowed to act on mesitylen, it likewise produces an oxidating effect ; there results,

$$C^6H^8+\overset{\cdot\cdot\cdot\cdot\cdot}{N}=(C^6H^8O+\dot{H})+\overset{\cdot\cdot\cdot}{N},$$

because the radical C^6H^8 requires oxygen to form a base. That the reaction takes place in the manner indicated by the above equation is proved by the fact, that the chlorine forms with the same substance a base corresponding to nitrate of oxide of pteleyl, acting simultaneously as a dehydrogenating and chloridising means.

Owing to the existence of the radical pteleyl forming an oxide with oxygen, which sometimes combines with nitric acid, and on other occasions with water, chlorine, and nitric acid with mesitylen yield combinations, which bear no parallel, though the reaction of these agents is in fact one and the same ; this, however, is merely meant according to the hypothesis of Berzelius, as, according to that by which the hyponitric acid is considered as a radical, we cannot account for this fact, since the nitric acid, by reacting on the mesitylen, gives no combination, into which the hyponitric acide enters as a constituent ; hence it does not yield a combination constituted in a manner analogous to that of the product resulting from the reaction of chlorine or mesitylen.

28. If water be added to a hot solution of benzin in nitrous acid, it will be formed—

$$C^{12}H^{10}+\overset{\cdot\cdot\cdot\cdot}{N}=(C^{12}H^{10}O+\overset{\cdot\cdot\cdot}{N}.)$$

That this fresh combination is not a corresponding one to $(C^{12}H^{10}+\ddot{S},)$ but a salt formed by the combination of the protoxide of benzin with nitric acid, appears from the fact, that when the solution of this salt in the nitrous acid is allowed to boil, the protoxide of benzin is converted into the oxide of benzin, and the salt ($C^{12}H^{10}O^2+2\dddot{N}$) is formed.

29. Toluin, by being treated with boiling nitrous acid, likewise forms nitrite of oxide of toluin; whereas the nitrite of protoxide of toluin is formed, if the above treatment takes place at the common temperature (Deville.)

30. If naphthalin is allowed to boil with nitric acid until the oil formed on the surface of the liquid ceases to exhibit the properties of naphthalin, according to Laurent, the combination ($C^{20}H^{14}+\ddddot{N}$) is obtained. To this Berzelius objects, that if the said combination would be thus constituted, the nitrite of oxide of ethyl ought to be considered as consisting of

$$(C^4H^{10}+\underline{\ddddot{N}}.)$$

To this I add, that under similar circumstances the paranaphthalin yields a combination free from nitrogen, and that if the action of the nitric acid be somewhat longer continued, the nitronaphthalese would be converted into nitrite of oxide of naphthyl $2(C^{10}H^7+\ddddot{N})=C^{20}H^{14}O^2+2\underline{\ddddot{N}}.)$* In the same manner as nitrite of the protoxide of benzin or toluin, under similar circumstances are respectively converted into the oxides of benzin and toluin. The nitronaphthalese ($C^{20}H^{14}O+\underline{\ddddot{N}}$) and the nitronaphthalese ($C^{20}H^{14}O^2+2\underline{\ddddot{N}}$) are, therefore, saline combinations, which may be respectively called the nitrites of protoxide and of oxide of naphthyl, designating, by the term naphthyl the radical, $C^{20}H^{14}$ of naphthalin.

31. It appears from the above instances, that by the combined influence of the application of heat, and the action of either the nitric or the hyponitric acids, an oxide of a radical may be raised to a higher stage of oxidation. This radical,

---

* From the analysis of this combination resulted 2·90 of hydrogen. According to calculation it ought to have been only 2·41, supposing in the combination to be present six atoms of hydrogen for ten atoms of carbon. But 2·41 : 2·90 : : 6 : 772, it follows that the empirical formula is not $C^{10}H_6N^2O_4$, but $2C^{10}H^7N^2O_4=C^{20}H^{14}N^4O^8$.

however, being formed, by the influence of a dehydrogenating action of these acids, the oxide produced by the oxidating action of the same agents, it may easily be conceived, that if the reaction is longer continued, or made to work more energetically, the radical may simultaneously be changed, and oxides formed, containing a larger amount of oxygen than those previously produced. M. Laurent has, indeed, observed, that if the acid solution of the nitrite of oxide of naphthyl is allowed to boil until an oily body separates, a combination is formed, which the French chemist designates by the name of nitronaphthaleïse, which, however, is more properly called nitrite of oxide of naphthaleïn (azolite naphthaleïsique) considering the formula ($C^{40}H^{24}O^{5}+5\overset{\cdot\cdot\cdot}{\underline{N}}$) which probably expresses its combination. If naphthalin, and nitric acid are boiled together, for four or five days, the above combination is converted into nitronaphthalese, or into the combination ($C^{20}H^{10}O^{3}+3\overset{\cdot\cdot\cdot}{\underline{N}}$,) which in the manner of that just quoted contains as many equivalents of acid as are equivalents of oxygen contained in the base. The fresh salt, therefore, is the nitrite of oxide of naphthalin.

The combinations in question, instead of being composed of an oxybase and nitric acid, contain, as the electro-negative constituent that of the three oxyacids of nitrogen, which is the least endowed with the power of oxidating, an energetically oxidating body being unable to expel the nitrous acid from its combination without changing the radical of the base.*

After this change, however, has once taken place, the nitric acid acts more intensely; the fresh radical is invariably more stable than the foregoing one (25,) it may form with oxygen a more stable base, and the oxide thus produced may combine

---

* It is with these salts, as with the compound kinds of ether, they cannot be brought under the law of Bertholet, because the nitric acid employed to expel the nitrous acid from its combinations, must act with an energy calculated to decompose the radical either wholly or partially. The discovery of the cause of this anomaly is indisputably one of the most important which in organic chemistry ever could have been made.

with a more energetic acid, even if the latter body be of the most powerful oxidating agents. In this manner, owing to a material change, by nitric acid, two acids are produced from *indigo,* in which the presence of nitric acid seems probable, and by a change similar to that which naphthalin undergoes when treated with this acid, a double acid is formed—

$$(C^{16}H^{6}O^{5}+\overset{\cdot\cdot\cdot\cdot\cdot}{N})+2\underline{\dot{H}}.$$

It is owing to the same cause that, by the direct action of nitric acid on wood spirit, the oxide of methyl, without being altered, may combine with this acid, whereas the base of alcohol, being less stable, reduces the nitrous acid to the stage of a less powerful oxidating agent to that of nitrous acid (21,) which may combine with another portion of the oxide of ethyl, that which has not been destroyed.

33. We have hitherto met with no difficulties regarding the explanation of the phenomena generally perceived by the reaction of either nitric or hyponitric acid on organic bodies. The reason of this is, that we admitted as correct Berzelius's hypothesis, according to which the organic combinations containing oxygen, consist of the latter metalloïd, and a radical. This hypothesis, however, is far from being opposed to facts, with which organic chemistry has been endowed in latter days; it is rather confirmed by the constitution and properties of the products formed by the action of several oxidising agents on a great number of hydro-carbonaceous substances; by the constitution of ethereal combinations, and others analogous to the latter; by the various stages of oxidation of acethyl, formyl, &c.; by the circumstances under which the artificial valerianic acid is formed; by the analogy of the constitution of margarylic or hypo-margarylic acid; by that of the proteïn, and of the two higher stages of oxidation, serving to regenerate the latter substances; by that of the œnanthic and azoleïnic acid; by that of the bitter almond oil, and that of the sulpho-pioramyls; by the constitution and properties of xanth-oxide and uric acid, and by the circumstances under which these bodies are pro-

duced; by the analogy of constitution of several chlorides of compound radicals, destitute of oxygen, and of the oxides of similar radicals; by that of the indenigen and indenoxide; by the various stages of oxidation of isaten, &c.; by the action of sulphuretted hydrogen on the nitrites of naphthalin and protoxide of benzin, of which are produced the amidures of the radicals; of these bases are produced—$(C^{20}H^{14}O+\dddot{N})+6H^{2}S=(C^{14}H+Ad)+4\dot{H}+6S$, $(C^{12}H^{10}O+\dddot{N})+6H^{2}S=(C^{12}H^{10}+Ad)\ 4\dot{H}+6\,S$. Finally, it is known to chemists that the constitution of the combinations formed by kakodyl, was understood by the illustrious Swedish chemist, at the time, when similar combinations were considered as composed in a manner totally different from that now believed to be the true one; induced by which circumstances the celebrated Bunsen attempted to isolate this radical.

34. Great, however, as the number of facts be, apparently warranting the truth of the hypothesis in question, it may, perhaps, not hold good in all cases, as it starts from a principle admitted in organic chemistry, viz., that *each oxygen combination of the first order is an oxide of a radical,* a principle found to be incorrect with reference to

$$\overset{\cdot\cdot\prime}{W}o,\ \overset{\cdot\cdot\prime}{U}r,\ \overset{\cdot\cdot\prime}{C}r,\ (\dot{K}\overset{\cdot\cdot\cdot}{C}r+Cr,)\ \overset{\cdot\cdot\prime}{S},\ (\overset{\cdot\cdot\prime}{S}+\overset{\cdot\cdot\cdot}{S},)$$

and in many others.* Notwithstanding, therefore, the most plausible analogies, Berzelius, not to be contradicted by his own hypothesis, considered these bodies as combinations of the third and second order. The combination of H. Rose, for instance, is, according to the Swedish chemist, composed of sulphuric acid, and chloro-sulphuric acid.

$$3(\overset{\cdot\cdot\prime}{S}+\overset{\cdot\cdot\cdot\prime}{S})=\overset{\prime\prime\prime}{S}+5\overset{\cdot\cdot\cdot}{S}.$$

And Peligot's salt would consist of

$$(\dot{K}\overset{\cdot\cdot\cdot}{C}r+\overset{\cdot\cdot\prime}{C}r)=(\overset{\prime}{K}+2\overset{\cdot\cdot\cdot}{C}r.)$$

With reference to Pelouze's acid, it might have been

---

* The sign ' means one equiv. of chlorine.

considered as something analogous to the sulphate of oxide of nitrogen; but since I have shown that the sulphuric acid does not enter into a combination with the oxide of nitrogen, and that the sulphurous acid, with regard to sulphur, acts the part of a radical, it became necessary to consider these combinations as well as oxynitro-sulphuric acid as being constituted in a manner analogous to that of the oxysulphuric acid.

35. Like the combinations of this kind, the benzamid also, and the oxamid, salicylamid, phtalamid, and other analogous oxidated combinations are composed of two radicals. Oxygen, therefore, may contribute to the production of compound radicals, and these, by combining with oxygen, chlorine, and sulphur, &c., may form oxy-acids, oxychloro-acids, oxy-sulpho-acids, oxy-bases, oxy-chloro-bases, oxy-sulpho-bases, and, finally, combinations also, in which either the oxygen, the chlorine, or the sulphur are no less acidifying agents than as means of reproducing bases.

The chlorine or the sulphur, however, being able to behave as the electro-negative element with reference to the oxygenous radical, and the oxygen itself, relative to a similar radical, acting the same part, it follows that, in an organic combination, the whole amount of oxygen is not employed in the formation of bases and acids, into the composition of which enters neither chlorine nor sulphur, nor any other substance acting relative to a radical as an electro-negative principle. The hypothesis, therefore, laid down by Berzelius, like the principle upon which it is based, may sometimes be found insufficient. A strange relation between two sciences, both purporting the study of bodies, which, though dissimilar in nature, yet are formed and changed according to the same laws, the same principles, and often, even, according to the same theories. This stamps the hypothesis of the Swedish chemist with a degree of probability which is wanted in that of his opponents; asserting that the hyponitric acid in compound radicals, may displace the hydrogen without being able to show that this acid acts the part of a simple body.

On the Constitution of the Hyponitric Acid.

36. Comparing the property of nitrous acid to combine with sulphuric acid, with that of the said acid to form with nitric acid hyponitric acid, and considering the fact that the latter acids may be decomposed by bases, Berzelius at first supposed that these combinations are composed of nitrous and nitric acids.

37. When H. Rose, however, was believed to have prepared the sulphate of oxide of nitrogen, the Swedish chemist, in accordance with the German, considered the hyponitric acid of a constitution analogous with that in question. Both these views not well agreeing with the laws of multiple proportions, it remains to ascertain whether the hyponitric acid is a particular stage of oxidation of nitrogen.

38. If from motives on which the first hypothesis is based, the hyponitric acid is composed according to $\dddot{\mathrm{N}}+\overset{\cdot\,\cdot}{\dddot{\mathrm{N}}}$, the nitrous acid ought to consist of $2\dddot{\mathrm{N}}+\overset{\cdot\,\cdot}{\dddot{\mathrm{N}}}$, owing to the influence which an excess of oxide of nitrogen has on nitric acid, and to the property of the acid formed in this reaction, by which, on being put together with water, it may be resolved into the binary combinations of which it was formed. The nitrous acid, however, in contact with the hydrochloric acid, forms no chlorine. It, therefore, contains no nitric acid, from which we may conclude that the hyponitric also contains none.

39. If the hyponitric acid would be composed according to formula $\underline{\ddot{\mathrm{N}}}+2\underline{\overset{\cdot\,\cdot}{\dddot{\mathrm{N}}}}$, then, by the action of hydrochloric acid on a solution of this acid in concentrated sulphuric acid, oxide of nitrogen ought to be disengaged, which, however, does not occur.

40. The question may be resolved in another manner, by

starting from stableness, when two points are to be considered. The first is the relative stableness of combinations $\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$ and $\overset{\cdot\cdot\cdot\cdot}{\underline{N}}$, and the second that of the acids $\overset{\cdot}{\underline{H}}+\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$ and $\overset{\cdot\cdot\cdot}{\underline{N}}+\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$ or $\overset{\cdot\cdot}{\underline{N}}+2\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$.

The greater stableness of $\overset{\cdot\cdot\cdot\cdot}{\underline{N}}$ relative to $\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$ may be attributed to a cause similar to that by which the relative stableness of combinations $\overset{\cdot}{\underline{N}}$, $\overset{\cdot\cdot}{\underline{N}}$, $\overset{\cdot\cdot\cdot}{\underline{N}}$, $\overset{\cdot\cdot\cdot\cdot}{\underline{N}}$, is produced. It may likewise be ascribed to the affinity of $\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$ to $\overset{\cdot\cdot\cdot}{\underline{N}}$ or $\overset{\cdot\cdot}{\underline{N}}$. In the latter case, the hyponitric acid is a particular stage of oxidation, but it is not such a one in the second case.

If this acid is composed according to the formula $\overset{\cdot\cdot\cdot}{\underline{N}}+\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$ or $\overset{\cdot\cdot}{\underline{N}}+2\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$, it must be more stable than $\overset{\cdot}{\underline{H}}+\overset{\cdot\cdot\cdot\cdot\cdot}{\underline{N}}$, as the former may be formed by the action of oxide of nitrogen on the second, and because the stableness of a combination depends on its affinity; or it is proportionate to the affinity of the binary combinations, of which these combinations are constituted.* The foregoing observations and considerations, having shown that the hyponitric acid is less stable than the hydrated nitric acid, it follows that it is not a combination of nitric acid with nitrous acid or oxide of nitrogen. *Ibid. from Poggendorff's Annalen.*

---

*Supposing that the bodies are under the conditions stated in the said case.

ART. LXXIV—ON THE POWER OF DISSOLVING OXYGEN, POSSESSED BY LITHARGE IN A STATE OF FUSION, AND ON SEVERAL PECULIARITIES WHICH ACCOMPANY THE PRODUCTION OF LITHARGE BY CUPELLATION ON A LARGE SCALE.

By M. F. Leblanc.

We know that the cupellation which is practised in establishments where lead is prepared from the ore, is an operation, the object of which is to separate the silver from the lead, by eliminating the latter metal in the state of an oxide. Cupellation in the large way, or refining, as it is called, in some manufactories differs from the cupellation of the assay offices, on account of the litharge, or protoxide of lead being formed by the action of the oxygen of the atmosphere on the lead in a state of fusion at a high temperature, instead of being eliminated by absorption into the substance of cupel, it flows out of the furnace as fast as it is produced along a kind of gutter, which is constantly kept level with the surface of the melted metal. The substance that forms the cupel of the furnace, ought, as much as possible, to resist the absorption or dissolving action of litharge in a state of fusion.

The oxygen of the atmosphere is projected on the surface of the metal by a forced current of air.

During a visit I lately made to Poultaouen, I had an opportunity of being present at many of the operations for the refining of lead, containing silver, and of making several observations which perhaps will appear not devoid of scientific interest.*

---

* The process of refining at Poultaouen is usually performed upon about a ton of lead at a time; at the end of about eight or ten hours the fusion is complete, and they begin to skim the pot: soon afterwards

We know that the litharge of commerce should possess certain characteristics, which can be produced at will to a certain extent, by properly managing the duration of the time allowed for the cooling of the litharge that flows from the furnace. It is known that litharge when cooled quickly is yellow, or greenish yellow, and that litharge when slowly cooled, under the circumstances pointed out by M. Fournet, changes its structure and color, and acquires properties which cause it to be much sought after in commerce.

It is to the study of the physical and chemical modifications that produce this transformation, that I devoted myself.

M. Fournet admits, in effect, that litharge in fusion can absorb oxygen, by becoming super-oxidised, and that at a higher temperature than is necessary for the decomposition of minium. This philosopher admits that the red litharge so much sought after in commerce owes its properties to an excess of oxygen.

The opinion of M. Fournet is not shared by M. Thénard; this illustrious chemist repudiates the hypothesis of the super-oxidation of lead, at the temperature of the furnaces, cupel, and considers it possible that a solution of the oxygen in the litharge, analogous that of the same gas in melted silver, takes place. Thus oxygen unites itself to the protoxide of lead when the cooling process is slow, and disengages itself when it is rapid.

M. Pernolet, the present director of the mines and workshops at Poultaouen and Huelgoat, had previously observed that litharge in fusion held a gas in solution, varying at

---

the draught of air is employed, and the *obstrichs*, or black litharge, begins to pass over, it is a protoxide of lead mixed with oxysulphurets. The time occupied in the passing of the black litharge, varies according to the degree of the purity of the lead; it may continue for sixteen or twenty hours before they begin to collect the litharge of commerce. The total duration of the process for the refining of a ton of metal, is from 48 to 50 hours.

different periods of the process, and that this gas had a tendency to disengage itself at the instant the solidification took place. The facilities he was kind enough to grant me, enabled me to collect, carefully, the litharge, in different degrees of purity, and at various stages of the process; I also collected the gas when it was disengaged. The experiment completely confirmed the suspicions of M. Thénard, so far as regards the solution of the oxygen; for the gas collected offered me the properties of nearly pure oxygen. Its analysis indicated from 82 to 90 per cent. of oxygen. It cannot be said with certainty that the proportion of nitrogen was not due to the accidental presence of a small quantity of air; in fact, when repeating the experiment in the same manner upon silver taken out of the refining cupel, I did not find more than 90 per cent. of oxygen absorbable by heated phosphorus.

The quantity of oxygen dissolved in a given weight of litharge is too considerable to enable us to admit that the silver contained in the litharge could be the solvent of the gas; this proportion was not less than 50 cubic centimetres per kilogramme, notwithstanding the losses inseparable from the mode of operating. Besides, the last quantities of the litharge, and the richest did not contain more than 0.001 to 0.0015 of silver.

It appears to me, therefore, an established fact that litharge, a substance incapable of oxidation at the temperature of the furnace, might, under the influence of a current of air, dissolve the oxygen after the same manner as silver, and act as most liquids do when in contact with gases.

The black, or impure litharge is, according to my experiments, unfit for dissolving the gas; at least the quantity found was so trifling, that we may be allowed to consider its presence as accidental; analysis has also indicated oxygen and nitrogen, in nearly the same proportions as in the air. This circumstance will not be surprising, if we reflect that this excess of litharge contains sulphuretted, oxidisable elements.

Ought the solution of oxygen in a liquid in igneous fusion, and possessing no chemical action on the gas, to be considered as a general phenomenon, or merely confined to litharge and silver? It is a question, the experiments I propose to make may perhaps solve. The phenomenon is connected, perhaps, with questions arising out of geology, and consequently deserves an attentive study.

Not to wander from the subject of this note, I shall confine myself, for the present, to the examination of what passes in the centre of the masses of melted litharge when it leaves the furnace, and to the discussion of the part the imprisoned oxygen may play in these masses that become solidified, and end in changing, by degrees, their internal structure.

At Poultaouen, the litharge, when it leaves the furnace, and when it has acquired a sufficient degree of purity, is collected in iron pots of a conical form, and holding about 30 litres. The litharge is not long before it becomes solid on the surface, and it is then of a yellow or greenish yellow color; at the end of a few hours, sometimes at the end of half an hour, the mass breaks and splits in every direction, becoming a friable crystalline mass, possessing a deep red color; the crust, which had become suddenly solidified, alone preserves its color and coherence. The red litharge only, which is carefully picked out, is fit for sale; the yellow litharge is placed apart, to be revivified.

Sometimes the phenomenon takes place more quickly; a sort of explosion occurs, which, in the first instance, separates the conical mass of litharge into a number of large blocks, at the same time there is a projection of a certain quantity of litharge, which had remained liquid, or in a pasty state in the interior.

It appears to me to be probable enough that the oxygen imprisoned while the solidification was going on, acts mechanically in the phenomenon of the exfoliation of the litharge.*

It is proper to point out the fact that all those circumstances that tend to diminish the rapidity of the cooling process, and the solidification of the litharge, have also a tendency to increase the proportion of red litharge that is formed; when it is poured into vessels of insufficient capacities, the litharge cools too quickly, and remains yellow, and without exfoliation.

M. Fournet admits that red litharge contains more oxygen than yellow, and that it owes its color to a certain proportion of minium, a portion of which many specimens have exhibited the undoubted presence of.

M. Thénard, and most chemists, also, attribute the color of the litharge of commerce to the presence of a small quantity of minium.

Without wishing to deny that litharge, when slowly cooled, cannot, under certain circumstances, absorb oxygen and form minium, a well established fact I think, nevertheless, I am able to demonstrate that another explanation must be found for the exfoliation of the masses of litharge, and the production of red litharge. The following are the experiments on which I think I can rest this assertion :—

1. The red litharge I have examined gave out no oxygen by heat.

2. The same litharge tried with much care by pure nitric acid, furnished me with no puce-coloured oxide; a minute portion of minium added to yellow litharge, scarcely modifying its tint, could be discovered under the same circumstances.

3. The red litharge, heated to a temperature at which it gave out no oxygen, and thrown suddenly into water, became yellow.

---

* The first pots of litharge that are collected do not always exfoliate; nevertheless, I have proved that they sometimes contain oxygen in the state of gas, although in small quantities.

This experiment shows that the variations in the structure and colour of litharge, according to the circumstance of temperature that accompany its production, do not depend on changes in chemical composition, but much on modifications arising out of isomerism or dimorphism, like those that cause the difference between vitreous arsenious acid, and opaque arsenious acid, barley-sugar and sugar-candy, red iodide, and yellow iodide of mercury, &c.

These modifications in the structure and color of protoxide of lead have a relation to the density of the specimens. According to the experiments I have made, red exfoliated litharge is less dense than yellow crystallised litharge. Figures having connection with various experiments made for this purpose, will be found in my *Memoirs.*

In fine, the facts related in this note appear to me to establish—

1. That oxygen can be dissolved by litharge in a state of fusion, as it is dissolved in silver, and that it does not form a super-oxidized combination: the nitrogen dissolves in it, *perhaps* in a small proportion.

2. That physical differences of structure, color, and density alone exist between yellow and red litharge, which make no alteration in their chemical composition. The different varieties may be produced at will by a dry process, according to the circumstances of temperature, and the quickness of the cooling of the mass.—*Ibid. from Jour. de Phar.*

ART. LXXV.—MANNA.

By A. Leuchtweiss.

Manna has been examined by Fourcroy and Vauquelin, Thénard, and Buchholz. The latter found in the best manna:—

Mannite,	60
Mucous sugar and coloring matter,	5.5
Gummy extractive,	0.8
Gum,	1.5
A glutinous matter,	0.2
Water,	30

Thénard describes manna as containing mannite, 10 per cent. of fermentable sugar, and a nauseous uncrystallisable substance; the latter may be separated by means of æther. To obtain pure *mannite*, the sugar must be separated by fermentation, the filtered solution evaporated, the residue dissolved in boiling alcohol, of 0.833 specific gravity, when the mannite separates on cooling. By washing with cold spirit, it is obtained beautifully pure and white. Manna yields in this way from 32 to 42 per cent. of mannite.

The analysis of three specimens gave:

	I.	II.	III.
Water	11.6	13	11.1
Insoluble constituents (impurities)	0.4	0.9	3.2
Sugar	9.1	10.3	15
Mannite	42.6	37.6	32
Mucilage resin, an acid and nitrogenous matter	40	40.8	42.1
Ash	1.3	1.9	.19
	100	100	100

The ashes of manna consist of potash, lime, magnesia, peroxide of iron; phosphoric, muriatic, sulphuric acids, in minute quantities; and alumina and silica, probably from impurities.

The mucilage in manna is the same as ordinary mucilage. The sugar is crystallisable grape sugar. The resin and acid are soluble in ether.—*Ibid. from Liebig's Annalen.*

ART. LXXVI.—A NEW CAUSTIC FORMED BY THE MIXTURE OF SAFRAN (PEROXIDE OF IRON) WITH SULPHURI ACID.

By M. Velpeau.

During a series of experiments, to which he had for some time devoted himself, on the action of various powerful caustics, M. Velpeau at length arrived at sulphuric acid, solidified by safran, a combination that appeared to have the most happy results. To concentrate the sulphuric acid under the form of a ductile paste, or rather a soft pommade, not capable of extending beyond the limits he had traced out, he had to make a host of attempts and trials; it was necessary to discover a body or bodies which, combined with the liquid mineral, could form a concrete, without depriving it of its caustic properties. Asbestos, charcoal, flour, and various other substances failed. At length he came to safran, which incorporates easily, and in sufficient quantity to make a pommade of a proper consistence. This substance being carbonized by the acid, a paste of a beautiful black color is the result, reminding one of China ink or dried blacking. This paste is placed in a china vessel; the surgeon takes it up with a spatula and spreads it over the ailing spot as he would soft cerate; he forms a layer from two to four millimetres in thickness, more or less, makes the edges round and circumscribes the limits to the actual seat of the disease, leaving it exposed to the air for some time until it is dry·

A crust is soon formed, and it is then covered with a compress and bandage. The caustic that remains in the vessel cannot be preserved for any length of time. The sulphuric acid attracting powerfully the humidity of the air; but that which has been applied to the flesh forms a hard crust, and sounds, when struck, like charcoal, perfectly dry, bounded by the limits to which it has been applied, and of a depth equal to the thickness of the layer that was applied.

The slough began to detach itself from the eighth to the tenth day in the case of an individual who had submitted to its limited application. In the instance of a patient who had a cancer, and in whose case 100 grammes of the caustic pommade had been used, it was noticed with satisfaction that no symptom of re-absorption took place, and that, in addition, the caustic had the effect of completely removing the disgusting smell the cancer had hitherto possessed, and with which it infected the sick person and those near him. The cauterized tissues even gave out an odor rather agreeable than fetid. While waiting until additional instances shall enable us better to appreciate the value of the new agent, we ought to direct attention to the three important conditions it offers: namely, 1st, the exact circumscription of its action to the limits marked out by the pommade; 2d, the quick separation of the slough; and 3d, the absence of serious re-absorption.—*Chemist.*

ART. LXXVII.—MODE OF PREPARING EPISPASTIC PAPER

BY WISLIN.

THE great use made at the present day of epispastic paper, in the healing of blisters, the good effects that have arisen from it, in addition to the facility of its application, have brought this preparation into great favor; still, as the mode of manufacturing it was unknown, it remained a monopoly for a few of the pharmacopolists of the capital. I am only speaking here of the method employed for spreading the composition on the paper, not of the composition itself, most books of instruction containing several formulæ.

Every treatise on pharmacy, even the most recent, direct the employment of the common spatula, an impossibility when you consider the consistence of the matters employed, which will always be, according to the temperature, either too fluid or too solid, and they can never preserve their fluidity like various compositions employed in the making of plasters.

As we know that all these epispastic preparations have for their base hog's lard and bees'-wax, a substance which has never more than middling consistence, and passes, without transition, from excessive fluidity to a consistence too solid to be spread by the spatula. On this account, after having vainly attempted this method, I proceeded in search of another, and the following is a plan by which I was successful:—

After having prepared a number of strips of fine white paper, not much sized, 6 centimetres 3 millimetres in width, and 45 centimetres in length, I melted the epispastic composition in a plate, placed above a vessel of boiling water; I took the extremity of one of the bands of paper in the left hand, while, with the other hand, I held the other end of the paper raised in such a manner that described the arc of a circle; then I brought the under side of the paper close to the composition, and made it glide rapidly over the surface, taking particular care that the composition, which ought only to cover one side of the paper, does not touch the other. A little practice enables one to avoid this easily.

While the paper, guided by the left hand, passes over the surface of the composition, the right hand follows the movement, and lowers the other extremity when it arrives at the end; the paper, still supported by the left hand, finds itself thus placed horizontally above the plate, in which position it is held until it grows cold, the work of an instant only.

As fast as the papers are prepared they are ranged on a table by the side of each other, but in a few minutes afterwards they may be placed on the top of each other, without fear of their adhering. They are then cut up with a pair of scissors, and each strip of paper, of the dimensions we have described, will just make 5 pieces.

By varying the temperature you can change this paper at your will with more or less of the composition; so that, when you wish for a thin layer, you take care to keep the water boiling; if, on the contrary, you require a thicker layer, the heat must be below 100° C., which can be easily managed by interposing a plate between the boiling water and that which holds the composition; if it be required to be still more loaded you pass it a second time over the composition.—*Ibid., from Journ. de Chem.*

ART. LXXVIII—CONTRIBUTIONS TOWARDS THE CHEMICAL HISTORY OF THE GRATIOLA.

By M. Eugene Marchand, of Fecamp.

The gratiola (Gratiola officinalis, L,) *hedge hyssop*, is a plant endowed with purgative powers of the most energetic nature, and on this account it is sometimes used as a popular medicine, under the title of "the poor man's herb." Looking at it as one of the most active and most dangerous plants that grow in France, we ought to be astonished it has not, long since, attracted the attention of pharmacopolists and chemists; for one only, the learned Vauquelin, published, in 1809, the result of his inquiries into its constitution; but the means science, at that time, had placed at the disposal of the chemist were far from reaching the perfection and precision organic analysis has attained since that epoch. We must not, therefore, be astonished if plants, analysed at the beginning of this century, exhibit to the chemist of our day, who analyses them anew, principles of which his predecessors were far from even suspecting the existence. Having mentioned this to justify myself for having ventured to undertake, afresh, the analysis of a plant that merited the honor of being examined by Vauquelin, I shall endeavour at present to demonstrate, that the extremely bitter *resinoïd* matter, known to exist in the gratiola, and to which its properties are attributed, is not the direct principle, but a complex substance, a part of which only communicates to it its medicinal energy.

But, before we proceed further, let us examine the list of the principles Vauquelin detected in this plant. These were an extremely bitter resinoïd matter, an animal matter, a brown-colored gum, a vegetable acid, which Vauquelin believed to be either malic or acetic, and which was in combination with soda and lime, phosphates of lime and iron, oxalite of lime, chloride of sodium, silica, and woody fibre *Vauquelin, Bulletin de Pharmacie*, t. i. p. 481.)

It may be observed that Vauquelin has not mentioned tannic acid among these principles, and yet it exists in the gratiola. This was because, at the time Vauquelin undertook his task, men had extremely vague ideas of the constitution of organic substances, and on the characters they could offer in their reciprocal combinations. Although science has not as yet had the last word on the subject, it is at least permitted to us, in a host of instances, to dissect nature in a better manner, and thus be able to discover laws and substances she so obstinately conceals from us.

The whole of the tannic acid that exists in the gratiola is found in the resinoïd substance obtained by Vauquelin, and it exists in combination with othe rprinciples, among which is found one at least which ought to take its place near digitaline. In fact, if we dissolve in alcohol the resinoïd matter of Vauquelin; if we add it to the liquid sulphate of iron, until it becomes tinged with blue; if we add to this mixture as much hydrate of lime as is necessary to saturate the free sulphuric acid, and decompose the excess of sulphate of iron that was used; if we mix the alcoholic liquor with the water, for the purpose of afterwards filtering it (after having bleached it by means of animal charcoal, if necessary;) then, if the liquor is evaporated in *vacuô*, or rather in a situation where the aqueous vapor shall be constantly carried off by concentrated sulphuric acid, we shall obtain as a residuum a white matter; but still a compound substance.

This substance, by the addition of water, is partially dissolved, and gives an excessively bitter taste to the liquid. The intention in adding the water is to remove the mineral saline particles that are often, if not always, mixed up with the bitter principle of the gratiola, in this first part of the operation.

What remains after being washed in water is a substance easily reduced to powder. When hydrated ether is added to this, it softens, and is partly dissolved; while the portion that remains undissolved collects at the bottom of the vessel in the form of a syrup; this liquid separated from the layer of ether that floats over it, and dissolved in alcohol remains unclouded, and, if after thus having been mixed with the alcohol, it is left in the open air, we obtain, when the liquid has evaporated, a white mass, in which you may perceive a number of minute globules, resembling papilæ. This substance, in my opinion, bears the same relation to the gratiola, as the digitaline does to the digitalis, and I think I am authorized in proposing for it the name gratioline, or, better still, gratiolin, to show that the substance is not an alkaloïd, for the termination *ine* ought, in my opinion, to be reserved exclusively for that class of bodies.

Whatever may be the fate of this proposition, I shall no longer dwell upon it, but continue the enumeration of the characters this new principle presents.

It appears under the form of a white mass, made up of minute grains; it is to a very small extent soluble in water, to which it, nevertheless, imparts a very bitter taste, which, as in the case of digitaline, is particularly sensible at the back of the mouth; a small quantity of alcohol renders it rather more soluble in this liquid; alcohol dissolves it easily, and the liquid becomes milky when mixed with water; it is, to a certain extent, soluble in ether.

Placed in water, and submitted to the action of heat, until the water boils, it softens and collects on the surface under the form of a small oily drop.

Placed in a capsule of platinum, and heated in an open fire, it softens, swells, melts, becomes colored, is inflamed, burns with smoke, and at last leaves a residuum of black charcoal, which disappears by continuing the calcination. But I must still observe that, after this calcination, a small quantity of white ashes remain.

Sulphuric acid turns gratiolin yellow, and, while dissolving, it acquires a purple color; the solution does not turn green when mixed with water, but it makes it rather cloudy and becomes discolored.

Allow me, in connexion with this reaction, to offer a few reflections on the red color many bodies assume under the influence of concentrated sulphuric acid. It is sometime since M. Raspail pointed out, as a property characteristic of sugar, the power that substance possessed of developing a beautiful red color, when, after being mixed with albumen or oil, it is submitted to the action of concentrated sulphuric acid. More recently still, M. Pettenkofer observed, that when, in this experiment, you substitute biline for the albumen or oil, the red color still appears. As early as in 1838, the first of these two chemists, speaking of the red color salicine always assumes when in contact with sulphuric acid, gave this opinion, that salicine might perhaps be merely a combination of sugar, and a principle which he denominated *resineux*, and which in this case might answer the purpose of exciting the characteristic reaction of sugar. Since that time, distinguished chemists have added their authority to the opinion of M. Raspail; for, in 1839, M. Liebig was led to consider salicine as a combination of grape sugar and saliretine. More recently, M. Piria was induced, in his turn, after a series of very remarkable experiments, to consider the same body (salicine,) as a combination of sugar with another substance, discovered by himself, and to which he gave the name of saligenine. As we see, then, let the constitution of salicine be what it may, chemists always agree that sugar is one of its elements, and the opinion of M. Raspail is entirely confirmed.

Passing, then, to digitaline and gratioline, which also assume a beautiful red color when in contact with concentrated sulphuric acid; recollecting that these bodies, like salicine, are neutral substances, would it not be right to presume that sugar enters also into their constitution? I know that this question can only be resolved when we well understand the elementary composition of these substances; but it is a subject of study which, it appears, must lead to interesting results, and it would be desirable that chemists placed in favourable situations to undertake such a task would busy themselves with it. I am persuaded they would be amply repaid for their trouble.

After this digression, I again take up the description of the chemical characters of gratiolin.

Nitric acid dissolves it without discoloring it.

Chlorohydric acid dissolves it, and it assumes a yellow color.

Caustic potash communicates a dirty green color to it, which afterwards passes into a greenish yellow, and finally into white.

Caustic ammonia communicates to it a blue color, well marked, but without being beautiful. The reaction quickly takes place, and in a short time the mass again becomes white. It is useful to observe that, under the influence of these two agents, gratiolin does not dissolve in the alkaline liquor.

The extract of oak galls precipitates gratiolin from its watery solution, if the latter is perfectly neuter or slightly alkaline. If it is alkaline, the precipitation does not take place, for the tannate of gratiolin is soluble in liquor ammoniæ.

The etherous liquid, of which I have spoken above, having been evaporated, has left, as a residuum, a white uncrystallised substance, slightly bitter, insoluble in water, soluble in alcohol at 104°, capable of being precipitated from this solution by water, soluble also in ether. This substance is acted on by fire in the same manner as gratiolin, from which it differs, however, inasmuch as concentrated sulphuric acid slowly dissolves it, acquiring a yellowish-brown color, slightly tinged with red. But everything induces me to believe that the color developed under these circumstances would be simply yellow, if the substance on which we are engaged were not accompanied by a small quantity of gratiolin which, as we have already seen, is slightly soluble in ether.

In a forthcoming paper, I shall return to the chemical and therapeutical properties of gratiolin, and give the result of my inquiries into the chemical constitution of the gratiola.—*Ibid from Jour. de Chimie.*

ART. LXXIX.—ON A REMARKABLE CHANGE WHICH MORPHINE UNDERGOES BY THE ACTION OF SULPHURIC ACID.

By A. E. Arppe.

When morphine is dissolved in an excess of sulphuric acid, and the liquid evaporated to incipient decomposition, a white body is separated by adding water to the brownish mass, which is not sulphate of morphine, and does not contain a trace of morphine.

This white body is most readily obtained in the following manner :—Crystallized sulphate of morphine is treated with a slight quantity of dilute sulphuric acid, the mass evaporated and heated to 302°–322°. The brown mass thus obtained is boiled with water, so that the precipitate which had formed on the addition of water is entirely redissolved. The solution is filtered as hot as possible, when the white body again separates if the solution was sufficiently concentrated. That portion of the brown mass which was not taken up by the water is again treated in the same manner; a few drops, however, of sulphuric acid should be added, in order to produce a perfect solution on boiling. When a sufficient quantity of sulphuric acid has been used, and the stated temperature has not been exceeded during the evaporation, the precipitate formed is perfectly white, while the supernatant liquid is nearly colourless, and the filter is only coloured by a minute quantity of a light brown body. The white substance, collected on a filter, may be easily washed with cold water from the excess of sulphuric acid; it is then freed from adherent moisture by means of blotting-paper, and finally dried at a very gentle heat. The mother-ley contains a little more of the substance in solution, but it only yields a very impure preparation on evaporation.

The following are the properties of this body:—Its colour is white, and, after drying, always more pure than in the moist state, yet frequently with a brownish tint, which is generally not to be removed by the ordinary means. Suspended in the liquid, it separates readily in large caseous flakes, and on evaporation shrinks extremely. As seen under the microscope with a magnifying power of 200, it consists of round shining globules, which are perfectly homogeneous, but not in the least crystalline. Exposed to the air, it gradually becomes greenish on the surface; it is slightly soluble in water, but the solution is decomposed on boiling, and acquires an intense emerald-green colour. It is not dissolved or altered by alcohol or æther. In acid liquids, especially if sulphuric or muriatic acid is present, it is dissolved with the greatest ease without change; the substance separates unaltered on evaporating the dilute solutions, but it is decomposed by the concentrated acids with formation of a brown body. Alkaline fluids, especially when caustic and concentrated, act in a similar manner to the concentrated acids; they destroy the substance, and give rise to the formation of a brown product of decomposition.

Potash and ammonia produce in the acid solutions very considerable precipitates, which are readily soluble in an excess of the precipitant. Carbonate of ammonia likewise yields a precipitate, but does not redissolve it. These precipitates are especially characterized by the circumstance, that they soon acquire, when exposed to the air, a more or less dark green colour, being converted into another body which contains only two-fifths of the sulphuric acid of the white substance. The amount of sulphuric acid of this white substance is greater than that of the sulphate of morphine, but only a portion of the sulphuric acid is separated from a solution in muriatic acid by chloride of barium, while the other portion can only be detected after decomposition by chlorine. The analysis of the body, dried in a current of carbonic acid gas, yielded—

	Found.		*Calculated.*
Sulphuric acid -	14.66	14.14	14.63
Carbon - -	61.12	61.22	61.41
Hydrogen - -	5.88	5.58	5.84
Nitrogen - -	3.86	..	4.11
Oxygen - -	..	..	14.01

The organic constituent of this compound is, judging from its equivalent, equal to 4 atoms of morphine ; it may consequently be expressed by the formula $4\ (C^{35}\ H^{20}\ NO^{6}) + 5\ SO^{3}$. If we set out from the supposition that the morphine is a conjugated compound of ammonia, its sulphate, which contains, like the salts of the organic bases in general, 1 atom water, can be expressed by the formula $C^{35}\ H^{17}\ O^{6} + NH^{4}\ O,\ SO^{3}$, *i. e.* it contains 1 atom of oxide of ammonium instead of the ammonia. On being heated with sulphuric acid the whole of the water is expelled, and the peculiar sulphates of ammonia discovered by H. Rose are formed, in which the ammonia is conjugated with the sulphuric acid. Of these compounds the neutral is $NH^{3}\ SO^{3}$, and the acid one which Jacquelain analysed $3NH^{3} + 4SO^{3}$. If these two salts were formed in the substance examined, it is directly evident that the above composition must result, and the rational formula would accordingly be $(C^{35}\ H^{17}\ O^{6} + NH^{3}) + SO^{3} + 3\ (C^{35}\ H^{17}\ O + NH^{3}) + 4SO^{3}$. The fact that anhydrous sulphuric acid passed over effloresced morphine produces this body speaks in favor of this view; nevertheless the change which the morphine undergoes must be more considerable, since it can no longer be separated from the compound. Moreover, the circumstance that a portion of the sulphuric acid is precipitated by chloride of barium, while in the above ammonia salts none of it is thrown down, cannot be brought into perfect union with the view above mentioned; it might however be explained by a decomposition being perhaps effected by the acid employed to dissolve it.—*Chem. Gaz. from Ann. der Chem. und Pharm.*

ART. LXXX.—OBSERVATIONS ON THE THEORY OF M. PELIGOT AND M. BAUDRIMONT RESPECTING THE MANUFACTURE OF SULPHURIC ACID.

By Dr. Kœne.

In the 'Comptes Rendus,' vol. xix. No. 9, is a treatise by M. Peligot, the object of which is to prove,—1st, that in the manufacture of sulphuric acid, the sulphurous acid acts *incessantly* and *exclusively* on the nitric acid, with formation of sulphuric acid and hyponitric acid; 2d, that the formation of sulphuric acid is quite independent of the presence of the crystals in the lead-chambers.

This investigation has given rise to a dispute as to priority between the above chemist and M. Baudrimont, who likewise supposes that the hydrated nitric acid (*azotate hydrique*) is absolutely requisite for the formation of the sulphuric acid.

Both these chemists therefore agree that the sulphurous acid reduces the nitric acid merely to the state of hyponitric acid.

But from my investigations concerning the nature of the crystals which form in the lead-chambers, it results that the sulphurous acid reduces the hyponitric acid to nitrous acid. This result, which led me to consider the theory of M. de la Provostaye as incorrect, induces me also to show that that of M. Peligot is erroneous.

M. Baudrimont adopts, with the followers of the theory of M. Gaultier de Claubry, that the crystals, or at least an analogous compound, is indispensable to the formation of sulphuric acid; but this theory does not answer to the facts; for, as M. Peligot has proved, sulphurous acid is capable of deoxidizing nitric acid in the presence of a considerable quantity of water. This proves that the compound ($SO^3 NO^3 + SO^3 HO$) is not absolutely requisite, as was hitherto supposed, for the formation of sulphuric acid.

The sulphurous acid acts under these circumstances, deoxidizing precisely like hydrochloric acid, with which it possesses the same property in respect to nitric acid, and in almost the same degree. As long as the latter is not too diluted, the first two convert it into nitrous acid, which is decomposed into nitric oxide and nitric acid, if there is sufficient water present; but in the manufacture of sulphuric acid the quantity of water is seldom large enough for this change to take place, for it is not to the interest of the manufacturer to exclude from action one of the generators of his product, nor to convey more water into his lead-chamber than requisite for the formation of the acid; nor is it more requisite that he should introduce dilute acid into his large chamber at the commencement of the operation; it suffices if there be a sufficient quantity of aqueous vapour present to prevent the formation both of crystals as well as of nitric oxide. The reaction goes on regularly, and the product only contains traces of nitric acid; but then follows the reaction between sulphurous acid, nitric and hyponitric acid; for the hyponitric acid, which is produced by contact with sulphurous acid, instead of being oxidized and converted into a hydrated acid, forms under these circumstances, on the one hand nitrous acid, and on the other sulphuric acid as my experiments have shown.

In a leaden chamber in operation, the sulphurous acid therefore reduces the nitric to nitrous acid without the formation of crystals, the quantity of water being too large for the compound ($SO^3 \, NO^3 + SO^3 \, HO$) to be produced, and too small for the nitrous acid to be decomposed into nitric oxide and nitric acid.

When the latter case occurs, which happens sometimes under circumstances that must be regarded as accidental, the product is impurified with larger or smaller amounts of nitric acid, from which it is freed by passing sulphurous acid through it. This operation can never fail to succeed, because such an acid contains sufficient water for the nitrous acid to be decomposed into nitric oxide, which escapes, and into nitric acid, which is again destroyed by the influence of the oxidizing agent.

In the opposite case, when the sulphuric acid is too concentrated, the nitrous acid undergoes no further decomposition from the sulphurous acid : nor is it possible, by means of this acid, to free the commercial sulphuric acid at the ordinary temperature from nitric acid, but perfectly well from nitrous acid. The first of these acids is decomposed during the concentration into oxygen and nitrous acid, as I have shown, by allowing hydrochloric acid gas to act on the monohydrated sulphuric acid which had been employed for concentrating commercial nitric acid. No chlorine was disengaged, and thence follows, contrary to the opinion of M. Peligot, that the concentrated sulphuric acid contains neither nitric nor hyponitric acid. Nor can there be any nitric oxide contained in it, this not being perceptibly soluble in this acid; but it may contain nitrous acid, the presence of which may be readily proved, on the one hand by means of hydrochloric acid, and on the other by means of the protosulphate of iron and metallic copper.—*Chem. Gaz from Poggendorff's Annalen.*

ART. LXXXI—OBSERVATIONS ON HYPOSULPHITE OF SODA, OR SULPHITE-SULPHURET OF SODA.

By E. Mouchon.

The *Abeille Medicale* for the month of June, contains an article on the hyposulphite of soda. This work deplores, as we do, the complete neglect to which this powerful agent has been subjected, and, at the same time, applauds the praiseworthy efforts that have been made with complete success by the most distinguished dermatologist of the present day, to revive the credit of an article which the praises of Chaussier and Biett ought to have protected from any unhappy influence.

While we congratulate Dr. Quesneville for the happy idea, which first occurred to him, to restore to notice an anti-herpetic, so deserving of recommendation, let us blame him for having made the plan he adopts in the preparation of his syrup of hyposulphite of soda his own exclusive property, and let us beg of him to allow us to establish a formula which shall become the property of all.

The hyposulphite of soda is by its nature, easily subjected to this species of transformation. Its great solubility in water permits us, in fact, to have recourse to that method without the least fear of failure, and every pharmacopolist, who will give himself the trouble to tax his intellect for an instant, will be able to establish a rational formula. The following is one which I think as good as that of M. Quesneville. It is extremely simple, so that it requires but an instant to reflect upon it and put it in execution.

℞.—Hyposulphite of soda - - -	45 parts.
Distilled water - - - -	445 "
Sugar in coarse powder - -	1,000 "

Let the hyposulphite of soda be dissolved without heat in the distilled water, add the sugar to this solution, and dissolve it at the ordinary temperature of the air, or by means of a sand-bath, then filter the syrup through filtering paper.

Thirty grammes of this syrup will contain one gramme of hyposulphite, and this will enable you to dispense from thirty to one hundred and twenty-five grammes in the course of four-and-twenty hours.

No inconvenience appears to be attached to the use of the hyposulphite of soda, and this consideration, in addition to the incontestible advantages that result from its efficacy in cases of exanthemetic affections, painful irritations of the skin, slight congestions of the viscera, scrofula, lymphatic diseases, &c. This consideration, we say, ought to be an additional element of success for this preparation of sulphur, which more strongly fortifies us in our good opinion of its future favor. As to syrup in particular, it appears to us very right to favor the employment of this agent, which we also recommend with great earnestness, because it is at present extremely easy to have it always of a well defined strength and perfectly pure, thanks to its application to the purposes of daguerreotype processes; for it must be well understood that the state of oblivion into which it had fallen, was chiefly caused by the impure manner in which it used to be prepared.—*Chemist*, *from Jour. de Chimie.*

ART. LXXXII—A NEW PROCESS IN EUDIOMETRY FOR CALCULATING THE VOLUME OF THE ELEMENTS OF ATMOSPHERIC AIR IN RELATION TO EACH OTHER.

By M. Lassaigne.

Since the discovery of the component parts of the air, many methods have been employed by chemists to discover the relative volume of the constituent parts of this elastic fluid. The processes generally resorted to in laboratories, are all founded on the absorption of oxygen by various simple and compound bodies, whether at the ordinary temperature of the air, or by exciting the action, by caloric or electricity. In this manner the solution of sulphuret of potassium was formerly used, and afterwards phosphorus, hydrogen, and the binoxide of nitrogen have been employed, and of late years the proto-sulphate of iron, decomposed by potassium, has been recommended.

Dumas and Boussingault, by submitting air to the action of copper in a state of division, and heated to a dull red heat, has latterly produced an important modification which enables us to estimate, by weight, the oxygen and nitrogen which exist in the air, instead of calculating the volume of each of these gases, as was the case in old eudiometrical experiments.

In performing experiments, latterly, with protosulphate of iron, according to the directions of M. Dupasquier, and repeating the process he pointed out and published, we were led to adopt a test well known to chemists, but which, so far as we know, has never been applied to the analysis of air.

This method is founded on the readiness with which copper divided into thin tables becomes oxidised in contact with air, in the presence of liquid ammonia, and on the formation of a blue ammoniuret of deutoxide of copper.

Many successive experiments having shown us that this test, acting in a limited volume of air, in a very short time completes the total absorption of the oxygen contained in it, leaving the nitrogen free, we were induced to think of the application of this property to the analysis of the air; and the result has been what we expected.

The application of this new method is extremely simple, and it requires the employment of no peculiar apparatus. A common graduated tube 14 to 15 centimetres in length, and 12 millimetres in diameter, and a small phial with a ground glass stopper, containing 30 to 35 cubic centimetres, are the only vessels necessary.

The process consists in introducing into the phial from 3 to 4 grammes of copper turnings, then pouring in distilled water until the phial is half full, and afterwards filling it with a concentrated solution of ammonia. The bottle, thus completely filled, is closed with its glass stopper, and inverted in the water trough, taking care that the copper turnings do not rest on the orifice of the bottle. This first disposition being arranged, you measure a volume of air in the graduated tube filled with water, and by means of a small glass funnel it is passed into the bottle, which has been uncorked under water. This being done, the mouth of the bottle is immediately closed, and it is taken out of the pneumatic trough, and shaken incessantly for eight or ten minutes. In less than a minute or two the ammonia is seen to assume a bluish tinge, which becomes gradually darker, as the ammoniuret of deutoxide of copper is formed. This blue tint assumes its maximum of intensity when you operate on from 15 to 20 cubic centimetres of air, it then becomes gradually fainter, when all the oxygen of the volume of air on which you operate has been absorbed; this gradual loss of color, which points out the close of the operation, is due to the action of the copper, in excess, on the ammoniuret of the deutoxide, which is converted into colorless ammoniuret of protoxide.

When we have arrived at this point of the experiment, the gaseous residue is passed into the graduated tube for the purpose of measuring it, taking the precautions requisite in these kinds of operations. In the various experiments we have made, by employing the method we submit to the notice of chemists, the gaseous residue, after having been subjected to the action of the copper and ammonia, contains no trace of oxygen; for if phosphorus be introduced to detect it, it gives out no phosphorescent light in darkness, nor does it produce any diminution of its volume.

The volume of the nitric gas determined by this process, has always been two or three tenths of a degree greater than that obtained by the action of phosphorus upon the air. The proportion has been 79 : 792·2. The latter number deduced from our experiment, comes very near 79·17, which MM. Dumas and Boussingault have deduced from the most laborious analysis of the air.

When analysing an artificial mixture, composed of 41·5 air, and 57·5 nitrogen, in which the proportion of nitrogen is necessarily increased to 90·2, the new method indicates 90 of nitric gas.

The simplicity of this operation, and the short time in which it can be performed, will enable us, without doubt, to employ it in various cases.—*Ibid. from Comptes Rendus.*

ART. LXXXIII.—ON THE ACTION OF ALKALINE BICARBONATES ON VEGETABLE BASES IN THE PRESENCE OF TARTARIC ACID.

By C. Oppermann.

During his experiments on the organic bases or alkaloïds, the chemist is necessarily obliged to make use of the generic and specific characters these bases possess, and which consist, among others, of the property of being separated by powerful inorganic bases and alkaline carbonates. In the latter instance, as we know, they often occasion, incidentally, combinations between the displaced and the displacing bases of such a nature that these reactions offer the means of distinguishing one from the other, on account of some being dissolved in an excess of the precipitating base, while others remain insoluble.

The phenomenon of the precipitation of bases by one another, when they are in the state of a salt, is not, however, a constant phenomenon. We know, by the experiments of Lasonne and Rose, that many organic substances, such as tartaric acid, sugar and albumen oppose themselves to the displacement and precipitation of an oxide, to such an extent as to resist the agency of a number of tests. M. Persoz having remarked, that, like alumina, certain organic bases possessed the property of being concealed by tartaric acid, I have endeavoured to ascertain to what extent this phenomenon was peculiar to this particular substance, for the influence such a fact might have upon inquiries into vegetable alkalis is easily conceived. I have, therefore, made experiments to ascertain whether tartaric acid, albumen, and other fixed organic bodies, possessed, or not, the property of preventing the separation and precipitation of a vegetable alkali. I shall in this place, merely give the result of my experiments on the action of the salts of morphia, narcotia, strychnia, brucia, quinia, cinchonia and veratria, in the presence of tartaric acid, and fixed alkaline bicarbonates. The solutions of the salts I have mentioned were made in the proportion of 1 of salt, to from 200 to 500 of water (the action is precisely the same, whether we operate upon these solutions, or on decoctions of the extracts of the plants that contain these vegetable bases, provided they are properly prepared;) tartaric acid being added until the action of the acid becomes well marked, and afterwards supersaturated with one or other of the fixed bicarbonates; it appears useless to add that the acid tartrates and alkaloïds show the same result.

The salts of morphia are not precipitated by the alkaline bicarbonates, but the salts of narcotia immediately produce a considerable white easily pulverised precipitate. If we wish to be satisfied of the complete absence of narcotine in a neutral solution, we employ sulphocyanuret of potassium; this test, which produces no cloudiness in neutral solutions containing morphia, immediately causes a precipitate of a deep rose color, in those which contain narcotine, even in a quantity too small to be detected by weight. But we must always remember that a slight excess of sulphocyanuret redissolves the precipitate formed.

The salts of strychnia, under the same circumstances, either produce easily pulverised precipitates, or furnish crystals of considerable size, according to the quantities of tartaric acid, bicarbonate of soda, or potassium employed, and according to the degree of dilution; if the solution be very weak, there is no precipitate, if it be rather less so, and if it contains much tartaric acid, it still does not form an immediate precipitate by means of the two bicarbonates, but at the end of a quarter of an hour, we see very long and thin crystals appear, whose number continues to increase until all the strychnia contained in the solution is crystallised, we may perfectly satisfy ourselves that the solution contains no more strychnia or salt of strychnia, by adding, as M. Marchand has indicated, peroxide of lead, and a mixture composed of sulphuric and nitric acids; the blue color to which a quantity of strychnia too small to be weighed gives rise, in the presence of these matters, is, as we know, a most certain sign of the presence or absence of this base; for chlorine, which M. Pelletier has recommended as a specific test for strychnia, acts in precisely the same manner on veratrine, as direct experiment has proved to me.

If the solution of strychnia is concentrated and contains but little tartaric acid, the bicarbonates immediately produce a white precipitate of a crystalline texture and the liquid no longer exhibits a trace of strychnia.

Brucia and the solutions of the salts of that base, differ completely in this respect, from the salts of strychnia; the alkaline bicarbonates produce not the slightest cloudiness.

These salts of quinine and cinchonine can also be compared and separated from one another in the same manner; the quinine cannot be precipitated when tartaric acid is present, while cinchonine is precipitated by the two alkaline bicarbonates.

In the solutions of the salts of veratria, acidified by means of tartaric acid, the bicarbonate of soda alone produces a precipitate, the bicarbonate of potash producing none.

We see, therefore, that in making use of the property possessed by tartaric acid of protecting certain bases from the action of alkaline bicarbonates, we succeed in establishing two alkaloïd groups, very distinct from each other, the first of which includes those that can be precipitated by bicarbonate of soda, and these are cinchonine, narcotine, strychnine and veratrine.

The second groups contain those that are protected from their action, namely, quinine, morphia, and brucia.

Tartaric acid also protects the infusion of gall nuts from the action of all these bases, with the exception of cinchonine and strychnia; but it abundantly precipitates the five others as soon as the acid has been neutralised by ammonia; it must be noticed, however, that an excess of this last base re-dissolves the tannate of brucia.

Besides this, we find, and this appears to me to be worthy of attention, that of the two bases which are met with in the same plant, one is constantly protected by tartaric acid, while the other is not: the employment of this method is valuable, because it allows us to separate the two bases with the greatest precision.—*Ibid. from Comp. Rendus.*

ART. LXXXIV.—CHEMICAL REMARKS ON CASCARILLA.

By A. Duval.

After giving a brief history of this substance, and detailing the analyses of it made by Boulduc, Boehmer, Trommsdorf, Caventou, and Felix Cadet, the author proceeds to give an account of his own analysis. He says, the following are the principal substances I have found in the officinal cascarilla:—Albumen, a peculiar kind of tannine, a bitter crystallizable principle (cascarilline,) red colouring matter,* fatty matter having a nauseous odour, wax, gummy matter, volatile oil (this has an agreeable odour and a spec. grav. of 9·938,) resin, starch, pectic acid, chloride of potassium, calcareous salts and woody fibre.

The most interesting of these principles is the bitter one. My process for extracting it is as follows:—I first select a

---

* This is insoluble in æther, but it is soluble in alcohol, to which it imparts a fine purple colour. It readily dissolves also in water containing an alkali.

bark the taste of which is strongly bitter. After having been coarsely powdered and placed in a displacement apparatus, it is treated with water. Solution of acetate of lead is added to the mixed liquids, which are filtered and freed from excess of lead by sulphuretted hydrogen. They are again filtered, evaporated to about two-thirds ; a small quantity of animal charcoal is then added, and the mixture filtered. The solution is evaporated at the lowest possible temperature. At a certain period a pellicle forms. When this has acquired a moderate consistence, and before the liquid becomes syrupy, the whole is allowed to cool, and the substance is carefully removed. Sometimes, however, it does not possess the crystalline aspect, but appears resinous, and adheres to the sides of the evaporating dish. It becomes harder by cooling.

To purify either of these substances, they are pulverized ; the powder is placed in a tube, and as much cold alcohol of spec. grav. 0·870 is poured over it as is rather more than sufficient to moisten it. After a sufficient interval, this alcoholic liquid, which is highly coloured, is poured off. The greater part of the fatty and colouring matters with which the cascarilline was mixed is thus removed ; the remaining powder is considerably decolorized. This is then treated with boiling alcohol of spec. grav. 0.835 ; a little animal charcoal is added ; it is then filtered and allowed to evaporate spontaneously. The residue is dried on unsized paper. To complete its purification, it is powdered, again treated with cold alcohol, and subsequently dissolved in boiling alcohol, filtered, and allowed to evaporate spontaneously. The bitter matter is thus obtained in a state of purity.

In this state it is white and crystalline ; the crystals, under the microscope, appear to be prismatic needles, sometimes mixed with hexagonal plates. It is inodorous and bitter, but this is not immediately perceptible on account of its slight solubility in water. When heated in a closed tube, it fuses, forming a yellow syrupy liquid with the aspect of caramel. It fuses at a lower temperature than salicine. Exposed to a great heat, it decomposes, evolving fumes which redden litmus-paper. It leaves no ash. Heated with potash in a tube, its vapours do not restore the colour of reddened litmus. It is very slightly soluble in water, but renders it strongly bitter. The solution is neutral to litmus-paper; it is not precipitated by either neutral or basic acetate of lead, tannin or alkalies. It is soluble in alcohol and æther. Concentrated sulphuric acid dissolves and instantly reddens it; the tint is very deep and tinged with purple. A certain quantity of water causes a precipitate in the solution. The liquid then appears green; as the precipitate subsides, it becomes paler. Ammonia does not dissolve the precipitate, but renders it of an ochreous-yellow colour. Nitric acid dissolves the principle, and the yellow solution thus formed is precipitated by ammonia. Muriatic acid dissolves it, acquiring a tinge of violet, which is converted into blue on the addition of a very small quantity of water. As cascarilline does not contain nitrogen, and combines with neither bases nor acids, it must be ranged among the neutral non-nitrogenous substances, with salicine, columbine, &c. Its intense bitterness, and the general analogy between cascarilla and cinchona, render it probable that it may be advantageously used in medicine.

Chem. Gaz from Journ. de Pharm. et de Chim.

ART. LXXXV.—NOTE UPON THE PREPARATION OF IRON REDUCED BY HYDROGEN.

By MM. E. Soubeiran and Dublanc.

Iron reduced by hydrogen, of which the employment was proposed by M. Quevenne, has been adopted in medical practice. It is now prepared in quantity for the use of the hospitals of Paris. It would appear at first sight that nothing could be more simple than to bring about the reduction of the oxide of iron, by a current of hydrogen gas; but when it comes to the trial, considerable difficulty is encountered. It is well known that no one yet has been able to arrive at results as satisfactory as those obtained by our associate Quevenne, who has applied to the study of this operation that patient and enlightened intelligence with which we all know he is endowed. Unfortunately he has not communicated all of his observations, and those have been forced, who have wished to prepare the *reduced iron*, to make a host of attempts, that have not always been successful. M. Thiebierge has published recently an interesting note on this subject; his ingenious apparatus will be useful to those who wish to prepare small quantities of the article, but does not answer the purpose in the more extended manufacture of it.

The reduced iron intended for medicinal use should be presented in the form of a minutely divided powder. The essential condition of success in the operation, consists entirely in the temperature, which, if not sufficiently high, the reduction does not take place; but if too high, the iron is reduced, but becomes agglutinated in ductile laminæ and the operation fails. To heat properly is then the principal object that should be proposed; to multiply the points of contact between the oxide of iron and the hydrogen is a second condition that it is necessary to fulfil; less essential without doubt, but of importance, if it be desirable not to lose considerable quantities of hydrogen gas.

We have confined ourselves to the employment as a vessel of one of the fountain pipes found in commerce. That which we employed was 4½ inches in diameter, and 22 in length. Such a vessel furnished from 9 to 11 oz. of iron by the operation.

To multiply the surfaces and diminish the proportion of inactive gas, we placed in the tube small floors (diaphragms) of iron gauze, between which were thin bars, the gauze being covered with the oxide; when all were arranged, they presented a solid mass. As the operation proceeded, the powder sank down and the passage of the gas was free.

Besides the pipe of reduction, the apparatus is composed of a large flask for the production of hydrogen gas, of a wide receiver, in which is condensed a part of the water, of a second flask containing concentrated sulphuric acid which dries the gas and serves at the same time as a guide to the operator. By the rapidity of the bubbles which are given off he sees if it be necessary to quicken or retard the disengagement; after leaving this vessel, the hydrogen gas traverses a tube full of chloride of calcium, from which it passes into the iron vessel; escaping from this it is conducted by a glass tube bent at a right angle and inserted beneath the surface of water in the receiver. To adapt the iron vessel easily to the other parts of the apparatus, we employed covers of iron which close it completely, and having in their centres iron tubes about 15 inches long. By means of this arrangement, the apparatus and iron vessel are heated together, and the connexions are sufficiently distant from the fire not to be injured.

We have said that it was necessary that the temperature should be sufficient, and that it should not be too elevated. We obtain a very convenient heat by the following disposition: A small enclosure is made of a range of bricks placed on the ground; upon these bricks is placed an iron grating and all round the grating a new enclosure of bricks above the lower ones. The height of two bricks gives a proper elevation; it is sufficient that they should be a little higher than the vessel for reduction. A rectangular furnace is thus constructed twenty-two inches long by fifteen broad. The iron pipe traverses the furnace lengthwise; it rests upon a support of bricks upon the grating two inches high. The advantage of this support is the prevention of the lower part of the pipe becoming more heated than the rest. The furnace is filled with charcoal so as to cover the pipe, and a limited escape is permitted to the ashes, so as not to allow the combustion to become too intense. By means of this arrangement the heat is never elevated sufficiently to conglomerate the reduced iron. If the temperature is not sufficiently great, it is perceived by the gas escaping from the extremity of the apparatus in as great abundance as it is formed. It is necessary then to give a little more activity to the fire by increasing the draught.

The oxide which we employ is the safran of Mars, of our Pharmacopœias. I should say however that I have operated with the oxide of iron, which is produced by calcining the oxalate. If this were not more costly, this oxide would merit the preference, for it contains less oxygen than the previous one, and, moreover, possesses less tenuity. It furnishes the most beautiful preparation.

It is necessary to remind those who wish to reduce iron by hydrogen, that it is necessary to wait before heating, until the apparatus has been deprived of air by the first current of gas, and that when the operation has terminated (which is perceived by no more water escaping) it is necessary to withdraw the fire and continue to pass the hydrogen, until the apparatus becomes cold. It is very convenient to adapt to the apparatus two copper stop cocks, one at each end. The current of hydrogen can then be arrested without waiting until the pipe becomes cool, as the cocks can be closed. When cool, the iron is withdrawn and subjected to slight porphorization.—*Journ. de Pharm.*

EXTRACTS FROM THE MINUTES OF THE PHARMACEUTICAL MEETINGS.

October 6th, 1845.

Charles Ellis, Vice President, in the Chair.

The minutes of the preceding meeting were approved.

There being no written communications, Samuel C. Sheppard called the attention of the meeting to some specimens of blue mass, numbered 1, 2, 3, 4, and 5. The first was manufactured by George W. Ridgeway of this city, the rest of various origin and quality. With a view to their analysis the specimens were referred to Ambrose Smith, Dr. Robert Bridges, and Samuel C. Sheppard, as a committee.

Dillwyn Parrish called the attention of the meeting to a specimen of Bittern, from the salt works of western Pennsylvania, from those springs containing Bromine. This Bittern, or mother water, resulting after the separation of the salt, is a dark coloured liquid, sp. gr. 1.419.

A specimen of bromide of iron was also presented.

Joseph C. Turnpenny remarked that, in mixing hydrarg. cum creta with inspissated ox-gall, the mercury was noticed to separate in considerable quantity without any moisture being added. Another member had observed the same phenomenon when extract of rhubarb was incorporated with the same preparation. The mercurial preparation was of good quality.

William Procter, Jr., exhibited specimens of extract of stramonium, with and without the chlorophylle. The latter was dark colored, and highly efficient.

The same member presented a sample of an article of opium, which had been sold in this city at Comly's auction store, at a third of the market price. It had the aspect of exhausted opium, and was made up into globular and compressed masses. The subject was referred to W. Procter, Jr,. J. H. Ecky, and J. C. Turnpenny, for examination.

November 3d, 1845.

Professor Bridges in the Chair.

The minutes of the last meeting were read and adopted.

William Procter, Jr., presented to the College, on behalf of Dr. Bridges, its American editor, a copy of Fownes' Manual of Chemistry.

Specimens of the copper ore from Copper Harbor, Lake Superior were also presented.

The committee appointed at the last meeting on the subject of opium, reported:

That they had submitted the opium referred to them to a careful examination, with the view of ascertaining the percentage of morphia it contained. One hundred grains when treated by the process of Dr. Staples, was found to yield three grains of the first crystals. By treating these with ether, the quantity was reduced to 2.65 grains which is about one fourth of the per centage contained in the best Smyrna opium.

An aqueous infusion of this opium gave evidence of the presence of meconic acid by adding a persalt of iron.

All the committee have been able to ascertain in reference to the introduction of the drug is, that it was sent on from Boston and advertised for sale at Comly's auction store, and was there sold, the most of it, with a destination for Baltimore. The cases were small, tin inside, and contained but about forty pounds each. The masses were much of the size and shape of ordinary opium, but quite dry, hard, and possessed of but little of the true opium odor. The masses had no rumex seeds adhering to their surfaces, and altogether possessed the aspect of opium that had been disintegrated by water, and the residue afterwards worked up into masses with the addition of some other matter.

William Procter, Jr.,
Joseph Turnpenny,
John H. Ecky,
} Committee.

The report was adopted.

Dr. Bridges on behalf of the committee on Pil. Hydrarg. appointed at the last meeting, reported progress.

December 1*st*, 1845.

Charles Ellis, Vice President, in the Chair.

The previous minutes were approved.

Silliman's Journal for July and October, were laid on the table.

A sample of Egyptian opium was presented by Thomas P. James, who stated that it was part of the lot that was introduced into this market eight or ten years since. It was found at that time to contain about 7 per cent. of morphia.

A specimen of lactate of soda, was presented by William Procter, Jr.

Dr. Bridges on behalf of the committee on blue pill mass, stated that the committee had been engaged with the duty referred to them, but were not yet prepared to report.

A sample of Gordon's blue mass was referred to the committee for examination.

William Procter, Jr., called the attention of the members to some specimens of acetate of zinc, with a view to the illustration of a new method of purifying that salt from iron. (See page 241 of this volume.)

Charles Ellis stated that an article offered for jalap was in the New York market, which proved to be mechoacan root.

January 5*th*, 1846.

Professor Carson in the Chair.

The minutes of the last meeting were adopted.

Reports of Committees being in order, Prof. Bridges, on behalf of the Committee on Blue Mass, read their Report.

The committee to whom was referred the examination of the specimens of blue pill mass, which were presented to the college by Samuel C. Sheppard, respectfully present the following report, viz.

Specimen No. 1 had a good pilular consistence and appearance, and was made by George W. Ridgeway of Philadelphia. One hundred grains of this mass was found to contain twenty-eight grs. of mercury.

No. 2 possessed the proper appearance and consistence, maker's name not known. This specimen contained twenty-six per cent. of mercury.

No. 3. This sample to which Clement Cresson's label was attached, was obtained by Samuel C. Sheppard from a stock put up for Dr. Shoemaker of Pennsylvania. Its consistence was so soft as to render it unfit for making pills without the addition of some other substance. One hundred grains yielded twenty-five grains of mercury.

No. 4 was labelled Baily of Wolverhampton, and had a good consistence and color. One hundred grains yielded twenty-five grains of mercury.

No. 5, was labelled "Pil: Hydrarg: L. P." It was dry pulverulent, apparently very old, and contained globules of mercury of sufficient magnitude to be visible to the unassisted eye. It contained thirty-four per cent. of mercury. This specimen probably contains a larger proportion of mercury than when originally prepared, owing to the evaporation of moisture.

These were the samples originally submitted to the committee, but in furtherance of the objects of the report they have examined four other specimens, viz.

No. 6. A second sample of Ridgeway's manufacture obtained from George W. Ridgeway by the committee. Its consistence was good, but the cut surface exhibited several white specks, and by analysis it yielded twenty-eight per cent. of mercury.

This specimen was made with the design of submitting it to the Committee, and the manufacturer states that the full proportion of mercury was employed, that the mill run a few hours longer than usual, and that nothing occurred in the process to which the deficiency could be attributed.

No. 7. A third sample of Ridgeway's manufacture, handed to the committee soon after No. 6, by G. W. Ridgeway. It possessed an excellent consistence and handsome appearance. One hundred grains yielded by analysis thirty-three grains of mercury.

This specimen was made after No. 6, and with the intention of having it examined by the committee. Its consistence was considered by the maker as more perfect. In making the Blue mass marked No. 7, Mr. Ridgeway states that he employed the ingredients for a fresh portion of the mass and added to it the remainder of No. 6, and worked the whole together.

It is due to Mr. R. to state that the investigation of his article was made at his instance, that he is confident of mixing the ingredients in the full proportion of the pharmacopœia in every instance, and that he cannot account for the deficiency in No. 6.

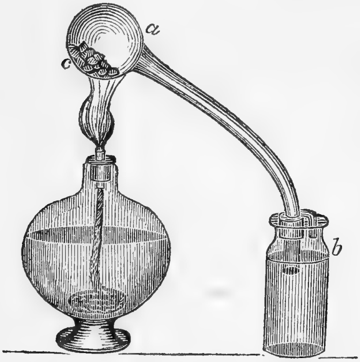
No. 8. A specimen of blue pill manufactured by Mordecai L. Gordon of Philadelphia, and said to have been made during a leisure period in the summer, and worked up for an unusual length of time. Consistence and appearance good, and contained twenty-six per cent. of mercury.

No. 9. A second sample of M. L. Gordon's make, recently prepared. Appearance good, but softer than No. 8. It yielded thirty-one per cent. of mercury, by analysis.

On further enquiry the committee find that the specimen of Gordon's No. 8, was subjected to the attrition of the mill for two weeks, by steam power, and that the instrument frequently, during that period, acquired a temperature little short of 140° Fahr.—also that the sample No. 9 was treated in the same way for only three days. Now as mercury will volatilize very sensibly at that temperature, and much below it, the committee think that the difference in the proportion of mercury may be owing, in part at least, to this cause, particularly as they have the testimony of the manufacturer that the full proportion of mercury was employed in each case. This is an interesting fact worthy of further investigation, and may throw some light on the cause of the variable strength of blue pill mass, when within a reasonable approximation to the prescribed quantity. If the experiment of long attrition was repeated, with the precaution of controlling the temperature of the mill, or instrument of manufacture, it would be conclusive as to the volatilization of the mercury being a source of variability.

In conclusion, the committee would observe that the examination of the above specimens, as to the per centage of mercury they contained, was conducted with great care, and they are confident in the accuracy of the results. The method of analysis they found most convenient and at the same time most reliable, is a modification of that of Prof. Reid of the New York College of Pharmacy, described by Mr. Adamson in the XVIIth volume of the American Journal of Pharmacy. The instrument was modified by blowing a bulb on the end of a tube, to contain the blue mass and iron-filings, and then inserting its open extremity, undiminished in diameter and slightly curved, into a vial of alcohol. The heat was applied gradually by means of a spirit lamp, and continued in each experiment for nearly an hour, to insure the perfect separation of the mercury. By suffering the alcohol to rise in the tube by the cooling of the confined air, and again chasing it out by expansion, every particle of mercury was driven into the vial. The empyreumatic oil, etc., was dissolved by the alcohol which was poured off from the mercury, and the latter washed with a second portion of alcohol, and put into a warm place, which evaporating the moisture enables the mercury to coalesce into one globule. In order to be assured of the perfect volatilization of the metal, the contents of one of the bulbs was heated to whiteness without any evidence of mercury. The alcohol, after removal from the mercury, was tested with proto-chloride of tin, without any indication of the former metal, and it is believed that the treatment by boiling with that salt, as recommended by Dr. Reid, is an unnecessary precaution.

As it may be convenient for those who have not paid particular attention to the examination of blue pill, to have a more explicit statement of the method of ascertaining the proportion of mercury, the following wood cut is annexed :



a A bulb of green glass of the capacity of half a fluid ounce, with the tube bent and inserted through the cork of a one ounce wide mouthed vial; *b* nearly filled with alcohol; *c* the blue pill previously mixed with about one fourth of its weight of iron filings, and rolled into little pellets, (50 grs. of blue pill mixed with 15 grs. of iron filings is a convenient quantity.) The tube of the bulb should descend a little below the surface of the alcohol, and another tube should pass through the cork to permit the escape of the uncondensed gases. The heat should be gently applied until the vegetable matter is entirely decomposed, and then increased until the bulb is heated to bright redness, which heat should be continued until all the mercury has distilled over.

Ambrose Smith,
Robert Bridges,
On behalf of the Committee.

Philadelphia, January 5th, 1846.

On motion the report was adopted and directed to be published with the minutes.

William Procter, Jr., presented specimens of oleic, margaric, stearic, and sebacic acids, artificial camphor, and valerianate of zinc. He found that three ounces of crystallized artificial camphor (hydrochlorate of camphene,) may be readily obtained by passing slowly the muriatic acid gas yielded by the reaction which takes place when two pounds of sulphuric acid are poured gradually on a pound and a quarter of chloride of sodium, through eight ounces of recently distilled oil of turpentine.

MISCELLANY.

Patent granted to Robert Oxland, Plymouth, Devon, for improvements in the Manufacture of Chlorine.—This invention consists in a method of manufacturing chlorine by the decomposition of hydrochloric acid by atmospheric air. The hydrochloric acid gas and atmospheric air are mixed in the proportion of one measure of the former to two of the latter; and the mixture is passed through an air-tight furnace, kept at a bright red heat. The hydrochloric acid is best obtained by decomposing common salt by sulphuric acid in a furnace or retort so heated that the products of combustion do not mix with the acid gas evolved; and the acid gas should be dried (previous to mixing it with the air) by passing it through a vessel filled with pieces of fire-brick, over which a small stream of sulphuric acid is constantly flowing. The requisite supply of atmospheric air is kept up by pumping it into an iron reservoir, furnished with a stop-cock or valve for regulating the discharge of the air. The decomposing furnace, through which the mixture of hydrochloric acid and air is passed, resembles an ordinary reverberatory furnace in form; but it is so constructed as to admit of the fire passing over the arch and under the bed; by which means the furnace is heated without the fire passing into it. The furnace is filled with pieces of porous pumice-stone, and the gas and air enter at the end furthest from the fire, and pass out at the other end through a pipe at the upper part of the furnace. That part of the furnace nearest the fire should be kept at a bright red heat by a fire acting externally, the smoke passing through flues over the furnace into the chimney.

The products resulting from the admission of hydrochloric acid and atmospheric air into the decomposing furnace consist of chlorine associated with undecomposed muriatic acid, and any excess of atmospheric air and nitrogen. This mixture is cooled by passing it through a series of earthenware tubes surrounded by water; after which the hydrochloric acid is effectually separated by passing the mixture through water; and, finally, the chlorine is obtained, and chloride of lime produced, by passing the residuary mixture into the ordinary lime condenser, where the chlorine is absorbed, and the nitrogen and atmospheric air remaining are allowed to pass into the atmosphere.—*Chem. Gaz.*

Examination of Oil of Amber. By M. Dœpping.—When we subject amber to dry distillation, it produces empyreumatic oils and resins, which offer no well determined chemical characters. If we submit these products again to rectification, we obtain a yellow oil, which has been already examined by Elsner, as well as by Messrs. Pelletier and Walter; their labours on this subject have led to nothing decisive. M. Dœpping has not been more fortunate. He confined himself to the task of showing that the rectified oil is plainly of the same composition as essence of turpentine, but that its boiling point is not constant, so that we cannot determine the density of its vapour. Treated with sulphuric acid the oil yields an oily carbonated hydrogen, which also shows a similar composition.—*Chemist, from Journ. de Pharm.*

Formula for Red Ink.—Two ounces of the best Brazil wood, half an ounce of alum, and half an ounce of crystals of tartar are boiled with sixteen ounces of rain or distilled water, down to half its bulk; half an ounce of gum arabic is dissolved in the strained liquid, and finally a tincture made of one and a half drams of cochineal and one and a half ounces of alcohol of 0.839 sp. grav. mixed with it.—*Chem. Gazette.*

The danger of arsenical injections in bodies intended for dissection.—The competition that has recently taken place for the situation of Superintendent of the anatomical labours of the Faculty of Medicine at Montpellier, has shown the danger arising from the employment of arsenic in the preservation of bodies intended for dissection.

Five of the candidates engaged in the dissection of bodies which had been injected with an arsenical solution, were not long before they became a prey to symptoms of a more or less dangerous character. Some were effected in the head with giddiness and dimness of sight, and the intellectual faculties became impaired and painful; others suffered particularly in the gastro-intestinal organs; violent pains, colic, diarrhœa, nausea, and vomitings affected them on the second day of their labour, and were followed by a feverish wakefulness.

In the case of them all one symptom was exhibited which we may call pathognomonic, so much was the characteristic it exhibited uniform and special; all the candidates experienced a most violent shooting and continued pain at the extremity of the fingers. The principal seat of this pain was in the fleshy part of the fingers, and even within the circumference of the nails it seemed impossible for any of the candidates to use an instrument of any description. An examination of the fingers exhibited a swelling at their extremity, and an injection, visible through the substance of the nail, resembling an ecchymosis, and in addition to this a violent pulsation in the collateral arteries; the nail, after a time, completely separated itself from the surrounding tissues wherever the ecchymosis existed.—*Chemist.*

Determination of the Causticity of the Soda Salts of Commerce. By M. Barriswil.—Having had occasion to examine, with M. S. Riess, alkalimetrically, some samples of commercial soda, we employed, in order to determine the caustic alkali, a new process of great accuracy, which, although demanding somewhat more time than the ordinary process, is so readily executed that it may be recommended to manufacturers, and in some cases it might certainly be employed with advantage in analytical investigations of the laboratory.

This process is founded on two chemical reactions, both well known, viz: —

1. When an excess of chloride of barium is poured into a solution of carbonate of soda, the filtered liquid is not rendered turbid by carbonic acid.

2. When the least quantity of alkali is added to a perfectly neutral solution of chloride of barium, the filtered liquid is rendered turbid by carbonic acid.

The process of analysis consists in determining the amount of barytes eliminated from the chloride of barium by the caustic alkali contained in the soda salt. For this purpose, 10 grms. of the soda to be assayed are dissolved in water, and to the solution one of 25 grms. of perfectly neutral chloride of barium, that is to say, an excess, added to it. It is now filtered, the filtrate washed, and a current of carbonic acid passed into the filtered liquid, which is then heated to boiling; the precipitate collected, washed and weighed. 1 equiv. of carbonate of barytes corresponds to 1 equiv. of caustic soda. This process, which we have frequently employed, has enabled us to detect less than 1 per cent. of caustic alkali in a soda salt, and to convince ourselves that certain samples, which were said to contain from 1 to 2 per cent. of free alkali, contained not the least trace. These samples were very rich sodas of remarkable purity; submitted to the alkalimetric test by Gay-Lussac's method, they saturated 58½ measures of the test-liquor, according to which they should contain 99 per cent. of pure and dry carbonate of soda. Astonished to meet in a commercial product, made on so large a scale, so remarkable a purity, we verified with chemically pure carbonate of soda our alkalimetric liquid, which had however been made with the greatest care. It required exactly 59½ divisions of the tube for 3·185 grms. of the soda salt. With nitrate of silver and chloride of barium, we obtained scarcely perceptible precipitates in the solution of soda previously saturated with nitric acid. One single crystallization removed the last traces of impurity.—*Chem. Gaz. from Jour. de Pharm.*

New and economical process for preparing oxide of Carbon.—By M. Filhol.—In the memoir which he published a short time ago on lactic acid, M. Pelouze noticed the following reaction as being very curious.

When we make a mixture of lactic acid and concentrated sulphuric acid, the latter acid being in great excess, we obtain, by gently heating the vessel which contains it, an abundant disengagement of pure oxide of carbon.

In reflecting on the relation of composition which exists between sugar and lactic acid, I was led to think that it was not impossible that a similar action might be established if sugar was substituted for lactic acid in the foregoing mixture.

The formula of crystallized cane sugar is $C^{24} H^{22} O^{11}$; that of hydrated lactic acid is represented by

$$\frac{C^{24} H^{24} O^{12};}{2}$$

thus, therefore, if the elements of 1 equivalent of water be substracted from the elements of 2 equivalents of lactic acid, we have the formula of crystallised cane sugar.

If we admit, with M. Juérin Vary, that the formula of anhydrous sugar of starch is $C^{24} H^{24} O^{12}$, it is evident that 2 atoms of lactic acid would just contain the elements of 1 atom of anhydrous sugar of fecula.

I heated in a matrass 20 grammes of cane sugar with 80 grammes of concentrated sulphuric acid; the mixture being maintained at a very gentle heat, a very brisk reaction was manifested, a very abundant disengagement of gas was produced, the mass swelled up, turned black, and became almost solid; I then stopped the operation. I had collected about 2 quarts of gas.

This gas formed, as was proved by the analysis which I made, of a mixture of carbonic acid and oxide of carbon. I ascertained that it contained about one-fifth of its volume of carbonic acid. I should say, moreover, that the composition of the mixture varies in each operation.

Deprived, by washing with lime water, of all its carbolic acid, this gas is colorless; it does not redden litmus; it is decomposed at a red heat of potassium, which absorbs its oxygen and produces a positive carbon; it burns with a pure blue flame. I proved by eudiometrical analysis that it consisted solely of carbon. Sugar of starch and fecula furnished analogous results, as it is evident, the reaction of sulphuric acid on sugar or starch differs from that which the same acid exerts on lactic acid, inasmuch as, with the latter acid, the oxide of carbon is obtained without the mixture of carbonic acid, but the separation of the latter is so easy that it will always be more economical to employ sugar.

This process, which is much more economical than all those which have ordinarily been used, is so easy of execution, that I have reason to hope that it will be adopted in all laboratories for the preparation of oxide of carbon.—*Chem. from Journ. de Pharm.*

To ascertain the purity of Myrrh. By M. Righini —Let it be finely pulverised and saturated for a quarter of an hour, with an equal weight of sal-ammoniac in powder, then add gradually fifteen times its weight of water. If the mixed powder dissolves quickly and entirely, the myrrh is pure.—*Chem. from Journ. de Chem. Med.*

Formula for Bochet's Ioduretted Syrup.—The formula of this syrup, which is very much in use at Lyons, has been communicated to us by M. Bertrand, pharmacien of that city. It is the following:—

℞. Sarsaparilla -
Sassafras - -
Guaiacum - } *aa* 1 kil.
Squills - -
Senna - -

Two decoctions are made in a sufficient quantity of water; they are mixed and reduced to 8 kilogrs.; 5 kil. of sugar and 5 kil. of honey are added; it is clarified with white of egg, and a syrup is made at 28°; it is heated after cooling, and 125 grammes of the tincture of iodine of the codex is added.

This syrup contains per 100 grammes, 1 gramme of the tincture. It is advantageously employed in swellings of the glands, especially of the thyroid gland, rachitis, scrofulous affections, degenerated venereal diseases and gout. A great number of cures have proved its efficacy.—*Ib. from Chem. Gaz.*

On a new Product resulting from the Decomposition of Urea. By Fr. Wöhler, and J. Liebig.—When perfectly pure dry urea is submitted to slow distillation, the greater portion of it is converted, not into cyanuric acid, but into a new body, which may be regarded as cyanurate of ammonia from which the elements of 2 equiv. carbonic acid have separated. In its behaviour it belongs to the series of the mellon compounds. On exhausting the residue of the distillation with a large quantity of boiling water, this product of the decomposition remains undissolved. In its dry state it forms a shining white powder, and is perfectly insoluble in boiling water, readily soluble in alkalis and acids, from which it is precipitated on neutralization. On the further action of these solvents, it is decomposed into ammonia and cyanic acid. Heated when dry, it leaves a lemon coloured residue, which on strong ignition is decomposed into cyanogen gas and nitrogen. The formula for this compound is $C^6N^4H^4O^4$.—*Chem. Gaz. from Ann. der Chem. und Pharm.*

On the Chemical Constituents of the Flores Chamomillæ Romanæ and anthemis nobilis.—M. Schendler has separated a peculiar acid from the

Roman chamomile, which greatly resembles valerianic acid, if it be not identical with it. He however only obtained 2½ drms. from 24 lbs. of dry flowers, while the same quantity yielded from 4 to 6 ozs. of the most beautiful essential oil, therefore far more than is usually stated. From flowers which had been kept for a long time much less essential oil is obtained than from fresh. The author, on distilling the flowers of *Anthemis nobilis*, obtained 1·17-1·10 per cent oil and 0·81 per cent. of a peculiar volatile acid, while Wyss obtained only traces of it in his analysis.—*Ibid, from Archiv. der Pharm.*

On the Artificial Production of Diaphanous Quartz. By M. Ebelmen.—When either of the two silicic æthers which I have recently described is exposed to the continued action of a moist atmosphere, the liquid finally solidifies to a transparent mass. This product, very delicate and fragile in the first days after its solidification, contracts more and more under the influence of the moist air still remaining diaphanous. Two or three months are requisite in operating on 5 or 6 grms. of æther, for the substance to cease to lose in weight and for its molecular movement to terminate. The substance prepared as above is hard, faintly scratches glass, and possesses great cohesion; its lustre, its fracture and transparency are perfectly comparable to the most beautiful rock crystal. Its density is 1·77. It is a hydrate, which contains twice as much oxygen in the silica as in the water, the formula of which is consequently $(SiO)^2\ HO$.

It is essential, in order that the product may not become fissured during the contraction it experiences before attaining the definite formula $(SiO)^2\ HO$, not to allow the moist air to enter except by an aperture of very small diameter. During the whole of the experiment the flask containing the silicic æther exhales an alcoholic odour, which persists a long time after the solidification, proving that only a portion of the organic matter had separated from the silica when the solidification took place. The contraction proceeds the more slowly the less easily the moist air is renewed in the apparatus, and this slowness appears indispensable to the success of the operation.

From the properties of the hydrate of silica, we may be allowed to hope that it may be turned to advantage in the construction of optical instruments. It is my intention to make some experiments in this direction.—*Ibid, from Comp. Rendus.*

On the Artificial Production of Hydrophane. By M. Ebelmen.—By slightly modifying the process for the preparation of hydrate of silica, described in the preceding paper, there is obtained, instead of a diaphanous product, an opake substance, which becomes entirely transparent when placed in water, in a word, true hydrophane. It suffices for this purpose that the silicic æther employed retain a little chloride of silicium, which happens when an excess of alcohol has not been employed in the preparation of the æther. On exposing this æther, still somewhat acid, to the action of moist air, there is obtained a solid mass, which is at first transparent, but ends by becoming opake after some week's exposure to the air. The translucidity of this substance is so much the less the greater the proportion of the chloride of silicium in the æther. Some of the fragments have the semi-transparency of opal. They all become entirely transparent in water.

We are therefore able artificially to reproduce hydrophane, this rare variety of quartz, and the curious property of which had struck mineralogists.

A very small proportion of foreign substances suffices in fact to modify the translucidity and the appearance of the hydrate of silica; thus a small flask containing silicic æther having been closed by mistake with a cork, which belonged to a bottle full of creosote, the æther, on becoming coagulated under the action of moist air, yielded a slightly yellowish silica, and merely translucid like chalcedony; the product thus obtained was not hydrophanous.

I propose to continue and to vary these experiments, which appear to me of great importance and of considerable interest.—*Ibid*, *from Comp. Rendus.*

Indelible Ink—May be prepared by adding lamp-black and indigo to a solution of the gluten of wheat in acetic acid. This ink is of a beautiful black colour, at the same time cheap, and cannot be removed by water, chlorine, or dilute acids. M. Herberger gives the following directions for its preparation:—Wheat-gluten is carefully freed from the starch, and then dissolved in a little weak acetic acid; the liquid is now mixed with so much rain-water that the solution has about the strength of wine-vinegar, *i. e.* neutralizes one-sixteenth of its weight of carbonate of soda. 10 grs. of the best lamp-black and 2 grs. of indigo are mixed with 4 oz. of the solution of gluten and a little oil of cloves added. This ink cannot be employed for marking linen, as it does not resist mechanical force.—*Ibid, from Jahrb. für Prakt. Pharm.*

Detection of Impurities in Disulphate of Quinine.—The following test for the adulteration of disulphate of quinine is recommended by Dr. Nevius of Liverpool, on account of its delicacy and simplicity:—To 1 or 2 grs. of the suspected salt add 3 or 4 drops of sulphuric acid in a white evaporating dish, and twice as many drops of water. If the salt contains either fatty matter or starch, these will remain; whilst, if they are absent, the whole will be dissolved. Next apply heat to the solution, and as it becomes concentrated the acid will char any sugar which may be present, which will be indicated by a black stain round the edge of the solution, and the whole will speedily assume the same colour. By this means 1 or 2 per cent. of organic matter may be recognised in as many minutes without trouble. It is said that salicine is an occasional adulteration, and, if present, it is detected by the same proceeding. If a very minute quantity only is mixed with the quinine, blood-red points, and ultimately a general reddish colour, are produced as the concentration proceeds. It is a good plan to observe the effect of the sulphuric acid before the addition of water, as it acts upon the salicine cold, producing the blood-red colour. Thus the single test of sulphuric acid, diluted and heated, detects nearly every impurity which is found in the disulphate; for starch fatty matters and insoluble earthy salts are left undissolved before the application of heat, and salicine, gum and sugar are shown by the effects of heat on the solution. Pure disulphate of quinine is not affected by sulphuric acid applied as above.—*Ibid, from Lancet.*

NOTE.—In the article on a new caustic by M. Velpeau, page 277 of this number, which has been extracted from the London Chemist, it is stated that the *Safran of Mars* is employed to fix sulphuric acid. It should have been stated *saffron,* which is carbonized and undergoes a CHANGE in accordance with the statement in the paper.—EDITOR.

INDEX I.

AUTHORS OF ARTICLES IN THE ELEVENTH VOLUME OF THE AMERICAN JOURNAL OF PHARMACY.

INDEX II.

SUBJECTS OF ARTICLES IN THE ELEVENTH VOLUME OF THE AMERICAN JOURNAL OF PHARMACY.